

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report									
RSY Pad: RSY 30 Use 2					Soil Origin: TU153C ESU				
Data attached and submitted by: Amy Mangel					Data Report Submittal Date: 02/11/2021				

Systematic Soil Sample Data: RSY 30 Use 2										
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	<sup>235</sup> U Final Analytical Results (pCi/g)	<sup>239</sup> Pu Final Analytical Results (pCi/g)	
Project Remediation Goals*										
HPPG-ESU-TU153C-001	1	Systematic	11,515	16,700	0.396	-0.0751	-0.0255	0.0294	-0.0141	
HPPG-ESU-TU153C-002	2	Systematic	11,230	16,700	0.476	0.0138	N/A	N/A	N/A	
HPPG-ESU-TU153C-003	3	Systematic	11,567	16,700	0.387	-0.0300	N/A	N/A	N/A	
HPPG-ESU-TU153C-004	4	Systematic	11,492	16,700	0.345	0.0181	N/A	N/A	N/A	
HPPG-ESU-TU153C-005	5	Systematic	11,345	16,700	0.448	-0.00130	N/A	N/A	N/A	
HPPG-ESU-TU153C-006	6	Systematic	11,096	16,700	0.515	-0.0138	N/A	N/A	N/A	
HPPG-ESU-TU153C-007	7	Systematic	11,394	16,700	0.0727	0.00327	N/A	N/A	N/A	
HPPG-ESU-TU153C-008	8	Systematic	11,491	16,700	0.434	-0.0838	N/A	N/A	N/A	
HPPG-ESU-TU153C-009	9	Systematic	11,460	16,700	0.354	0.00130	N/A	N/A	N/A	
HPPG-ESU-TU153C-010	10	Systematic	11,208	16,700	0.357	0.0281	N/A	N/A	N/A	
HPPG-ESU-TU153C-011	11	Systematic	11,235	16,700	0.407	-0.0282	0.0361	0.0186	-0.00186	
HPPG-ESU-TU153C-012	12	Systematic	11,152	16,700	0.0664	-0.0597	N/A	N/A	N/A	
HPPG-ESU-TU153C-013	13	Systematic	11,364	16,700	0.585	0.0301	N/A	N/A	N/A	
HPPG-ESU-TU153C-014	14	Systematic	11,263	16,700	0.486	0.0133	N/A	N/A	N/A	
HPPG-ESU-TU153C-015	15	Systematic	11,759	16,700	0.184	-0.0383	N/A	N/A	N/A	
HPPG-ESU-TU153C-016	16	Systematic	11,146	16,700	0.325	0.00969	N/A	N/A	N/A	
HPPG-ESU-TU153C-017	17	Systematic	11,269	16,700	0.309	0.0155	N/A	N/A	N/A	
HPPG-ESU-TU153C-018	18	Systematic	11,025	16,700	0.496	-0.00367	N/A	N/A	N/A	
HPPG-ESU-TU153C-019	19	Systematic	11,568	16,700	0.351	-0.0282	N/A	N/A	N/A	
HPPG-ESU-TU153C-020	20	Systematic	10,911	16,700	0.404	-0.0150	N/A	N/A	N/A	
HPPG-ESU-TU153C-021	21	Systematic	11,110	16,700	-0.017	-0.0275	0.0247	0.0321	0.00210	
HPPG-ESU-TU153C-022	22	Systematic	11,243	16,700	0.410	0.0259	N/A	N/A	N/A	
HPPG-ESU-TU153C-023	23	Systematic	10,829	16,700	0.346	-0.00225	N/A	N/A	N/A	
HPPG-ESU-TU153C-024	24	Systematic	10,889	16,700	0.395	0.0370	N/A	N/A	N/A	
HPPG-ESU-TU153C-025	25	Systematic	10,968	16,700	0.557	-0.0606	N/A	N/A	N/A	
Soil Systematic Sample Statistics										
					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	<sup>235</sup> U Final Analytical Results (pCi/g)	<sup>239</sup> Pu Final Analytical Results (pCi/g)	
					Maximum	0.585	0.037	0.0361	0.0021	0.0321
					Mean	0.3677	-0.0091	0.0118	-0.0046	0.0267
					Median	0.396	-0.0013	0.0247	-0.0019	0.0294
					Minimum	-0.017	-0.0838	-0.0255	-0.0141	0.0186
					Standard Deviation	0.1436	0.0329	0.0408	N/A	N/A

Biased Soil Sample Data: RSY 30 Use 2									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	<sup>235</sup> U Final Analytical Results (pCi/g)	<sup>239</sup> Pu Final Analytical Results (pCi/g)
Project Remediation Goals*									
HPPG-ESU-TU153C-B-001	1	Biased	11,611	16,700	0.395	-0.0202	-0.00953	0.0210	0.0218

CPM Counts per minute

pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10222020-PG-ROV-211	10/22/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10222020-PG-JSS-216	10/22/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10232020-PG-JSS-220	10/23/2020	3x3	10/15/2021	117652
Biased Sample Survey	HPRS-10232020-PG-JSS-221	10/23/2020	3x3	10/15/2021	117652

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 30 Use 2
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 16 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection. Note: this pad was partially full, which is why there is a smaller number of scan data points.
2) One-minute static follow-up measurements with the RS-700 were collected at 16 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-29. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 30-65). The systematic soil samples were also analyzed for total strontium as well as for $^{235}\text{U}$ and $^{239}\text{Pu}$ by alpha spectroscopy. Total Strontium, $^{235}\text{U}$ , and $^{239}\text{Pu}$ results are also included in the TestAmerica sample results report (pages 30-65). Samples HPPG-F-017 and HPPG-F-018 are field duplicates, correlating to systematic samples -007 and -019. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 66-82). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
<b>Conclusions:</b>  In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.  RSY 30 Use 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-153C ESU.  APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-153.

## Soil Scan Statistics

### Statistical Summary

Dataset		PG-RSY-30-U2				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	28.06	13.73	13.03	3.84
ROI-06		64.13	129.28	95.43	95.20	9.95
ROI-07		48.12	107.22	73.74	74.14	8.65
ROI-08		85.19	152.31	119.17	118.28	11.34
ROI-10		2,157.46	2,671.66	2,429.44	2,431.71	80.84

### Statistical Summary Reference Background

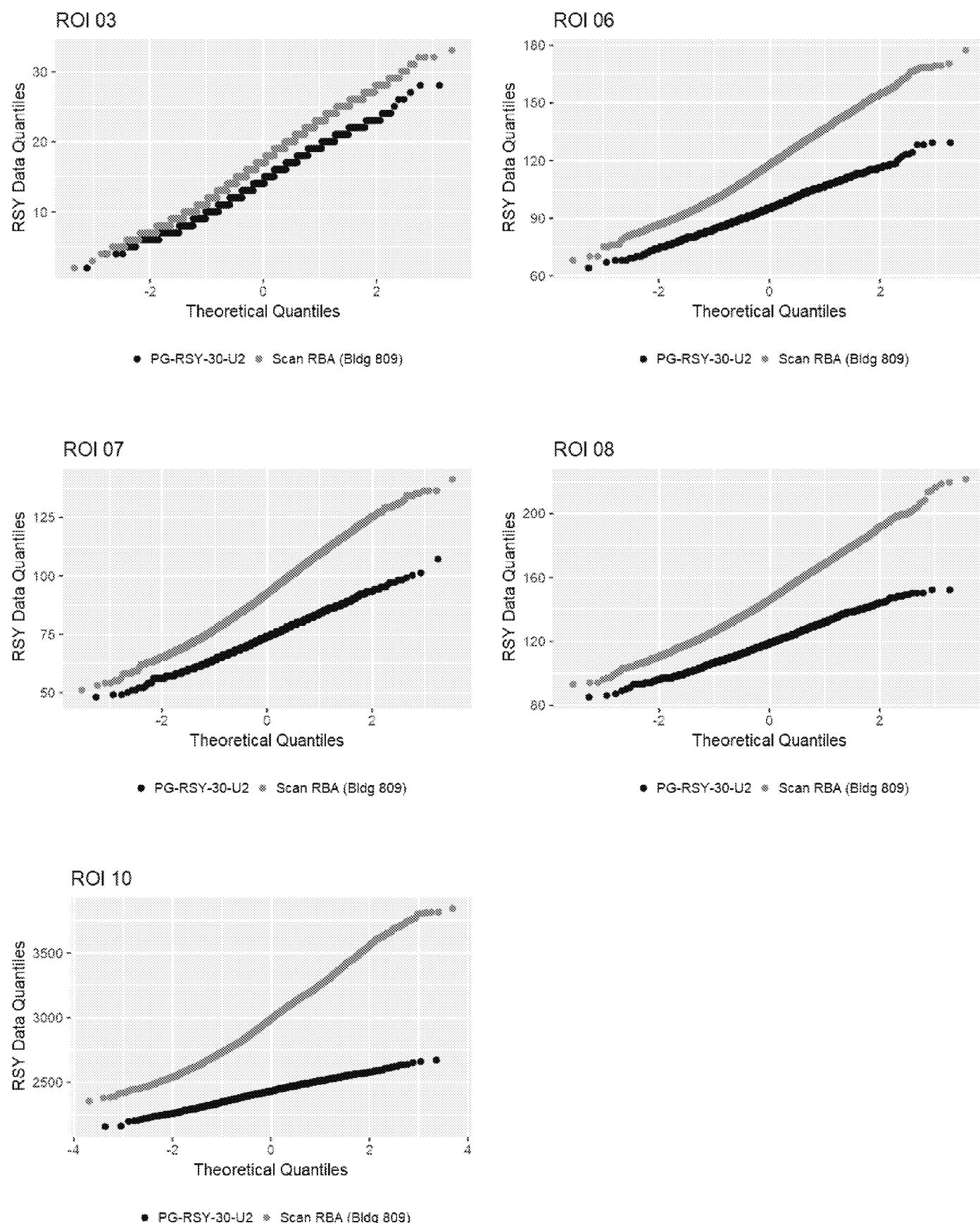
TYPE		Scan RBA (Bldg 809)				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-30-U2	1310
Scan RBA (Bldg 809)	4632

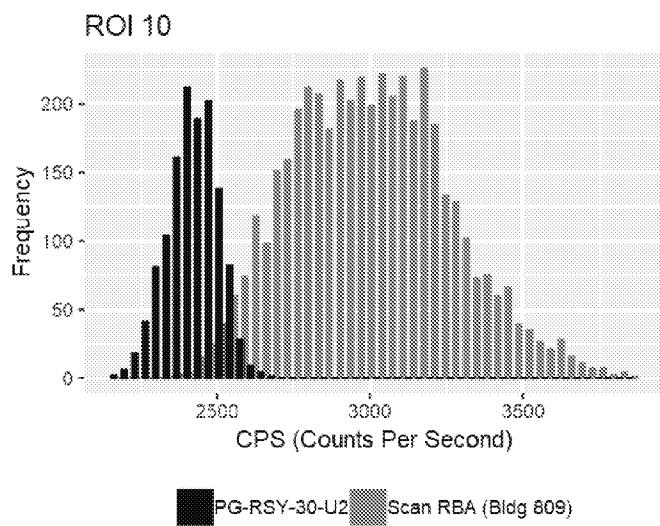
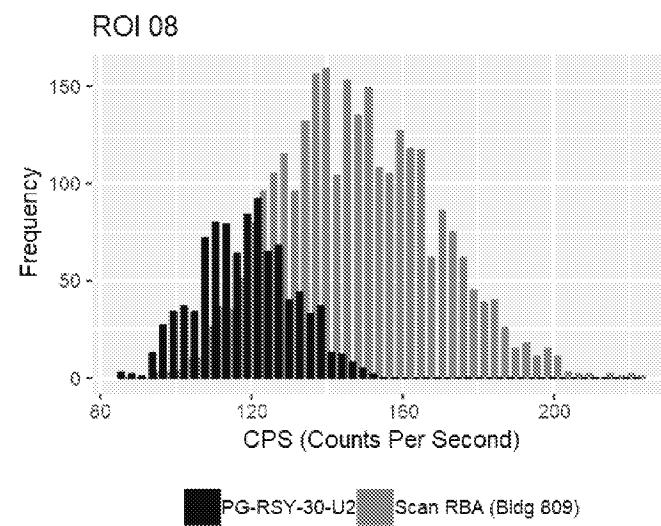
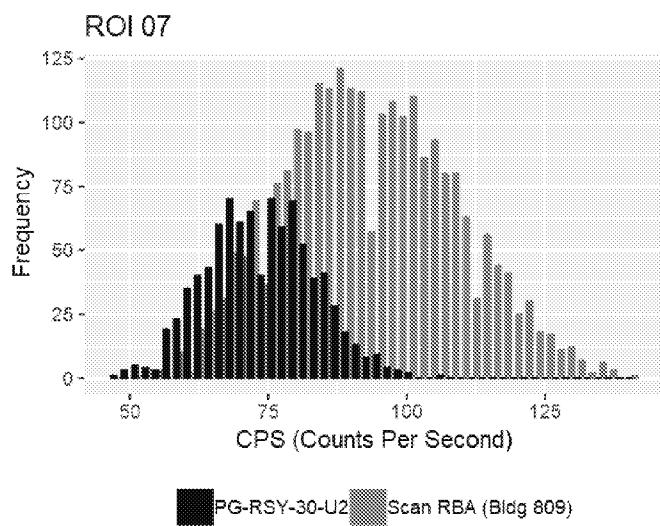
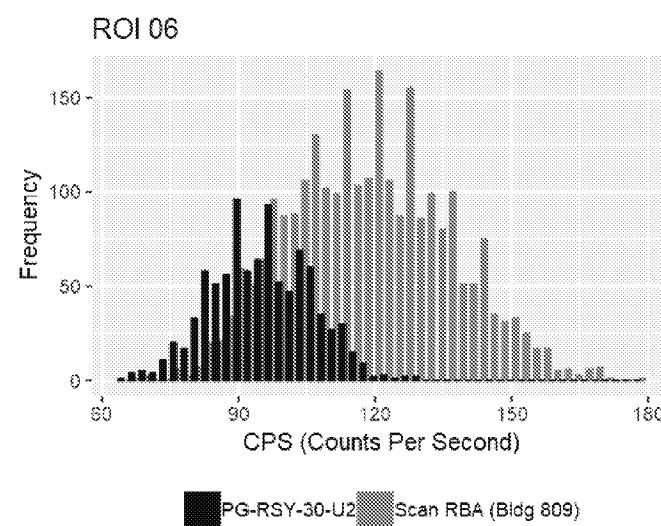
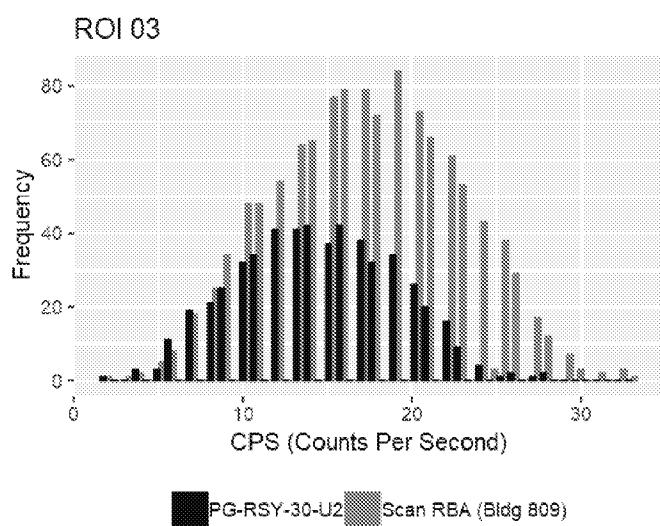
# Soil Scan Statistics

## Normal Q-Q Plots



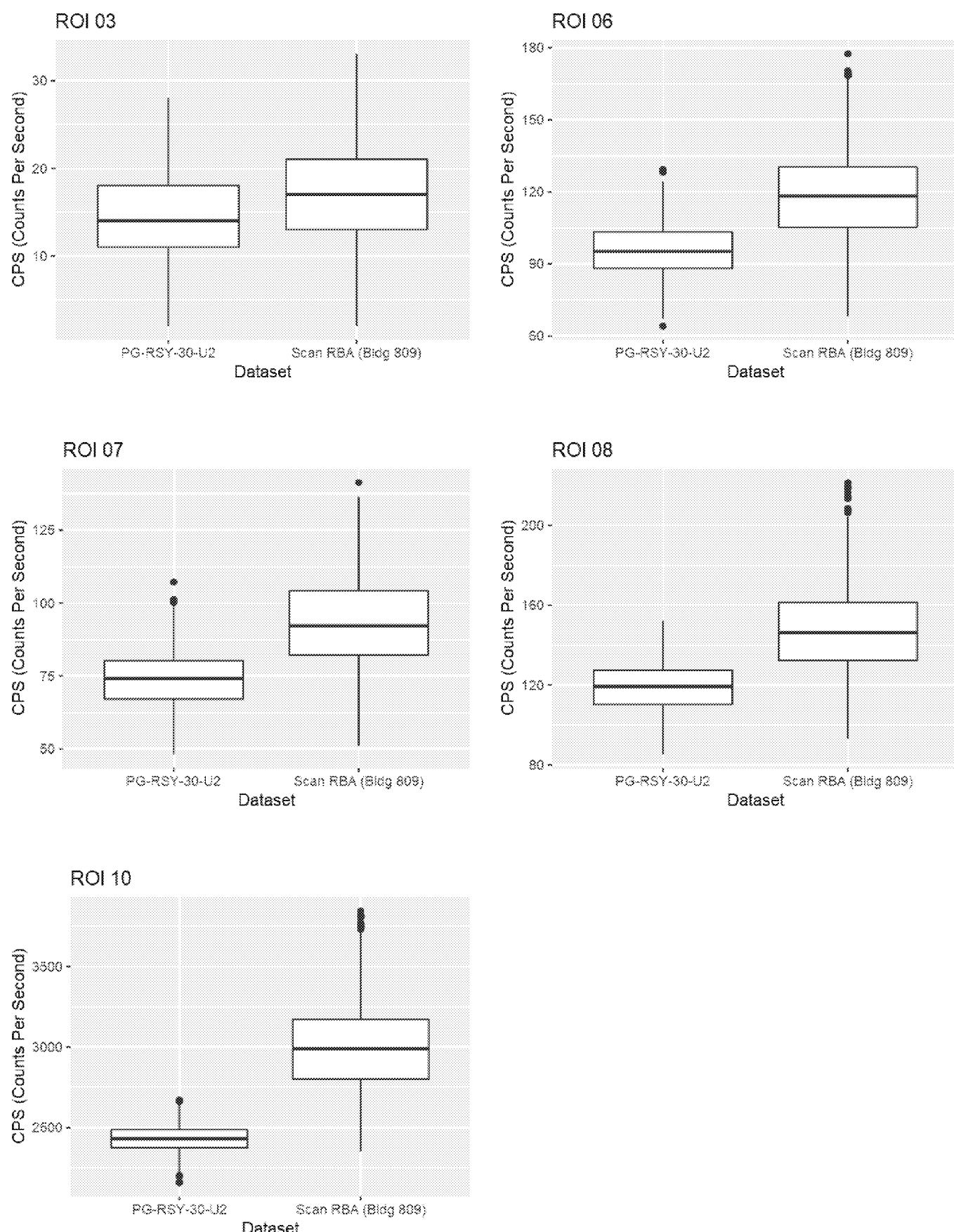
# Soil Scan Statistics

## Histograms



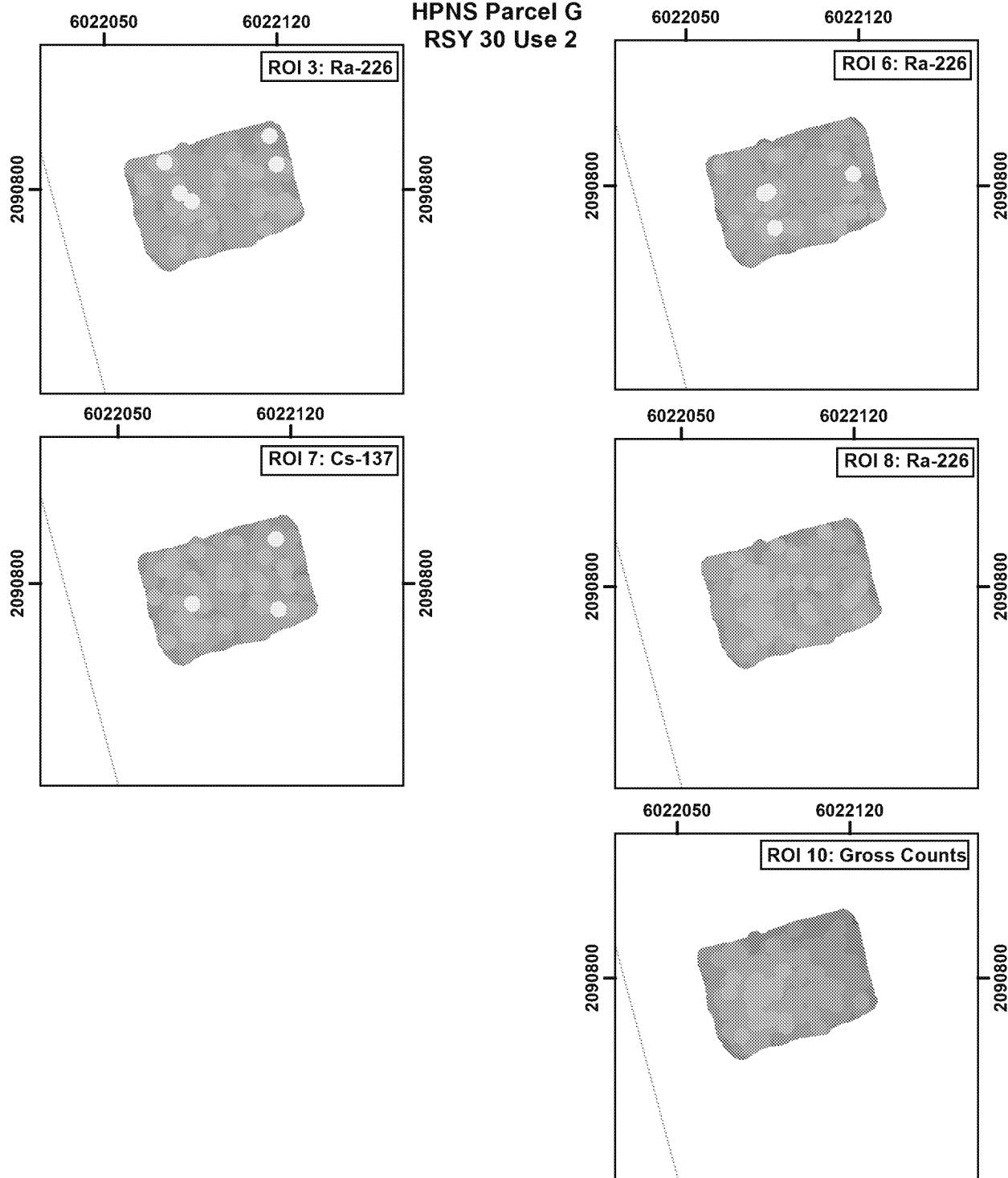
# Soil Scan Statistics

## Box Plots



**RSI Data Plots**  
**HPNS Parcel G**  
**RSY 30 Use 2**

TU-153C ESU



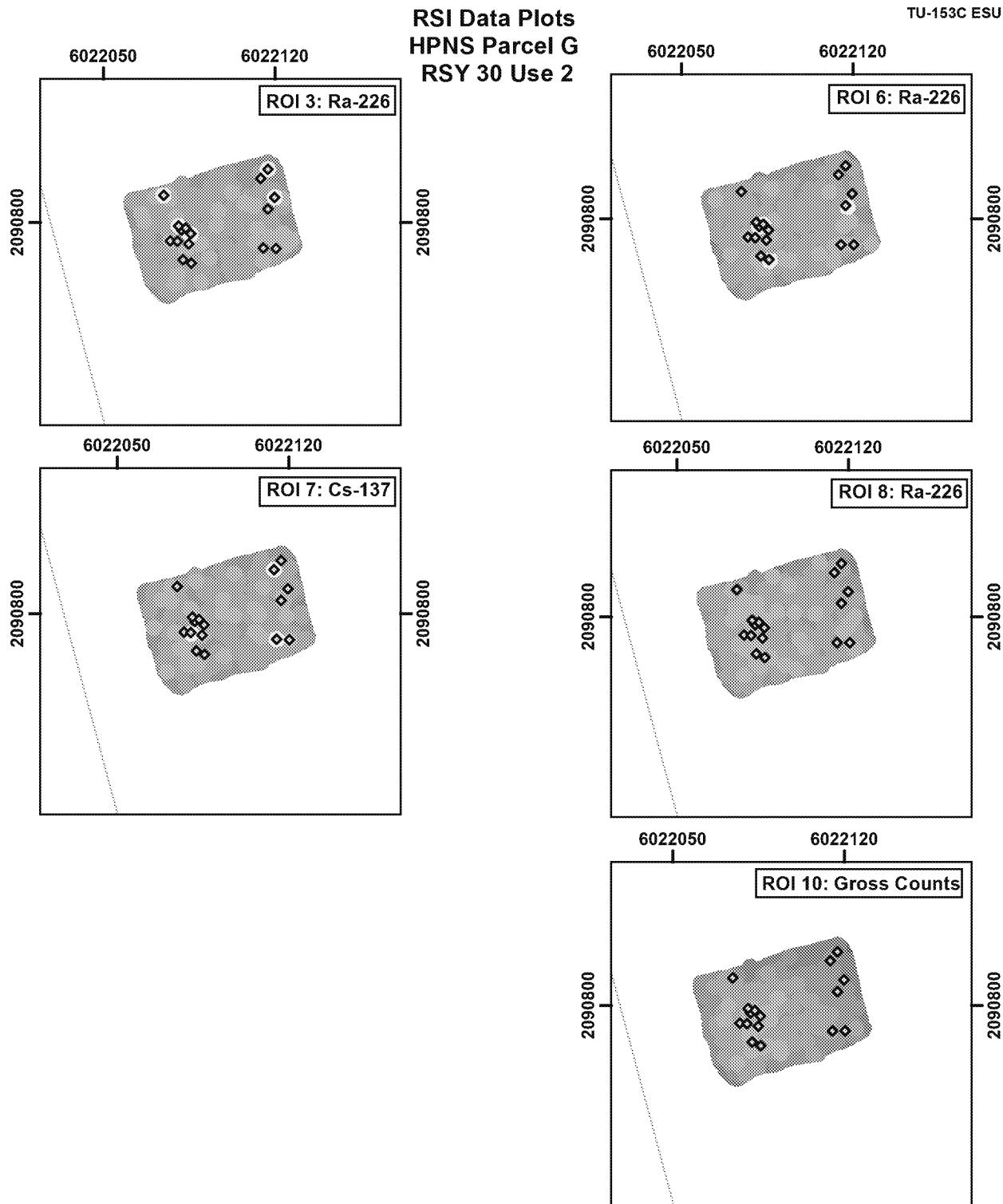
**RS 700 Gamma Walkover Survey Data (VD1)**

- |                      |                        |
|----------------------|------------------------|
| > 3 std dev          | ● > -1 to < 0 std dev  |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev         |

0      25      50      100  
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot




**RS 700 Gamma Walkover Survey Data (VD1)**

- ◆ Follow-Up Location
- > -1 to < 0 std dev
- > 3 std dev
- > -2 to < -1 std dev
- > 2 to < 3 std dev
- > -3 to < -2 std dev
- > 1 to < 2 std dev
- < -3 std dev
- > 0 to < 1 std dev

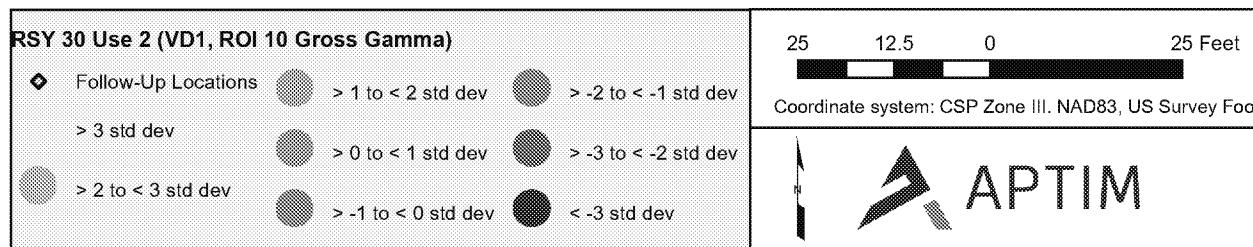
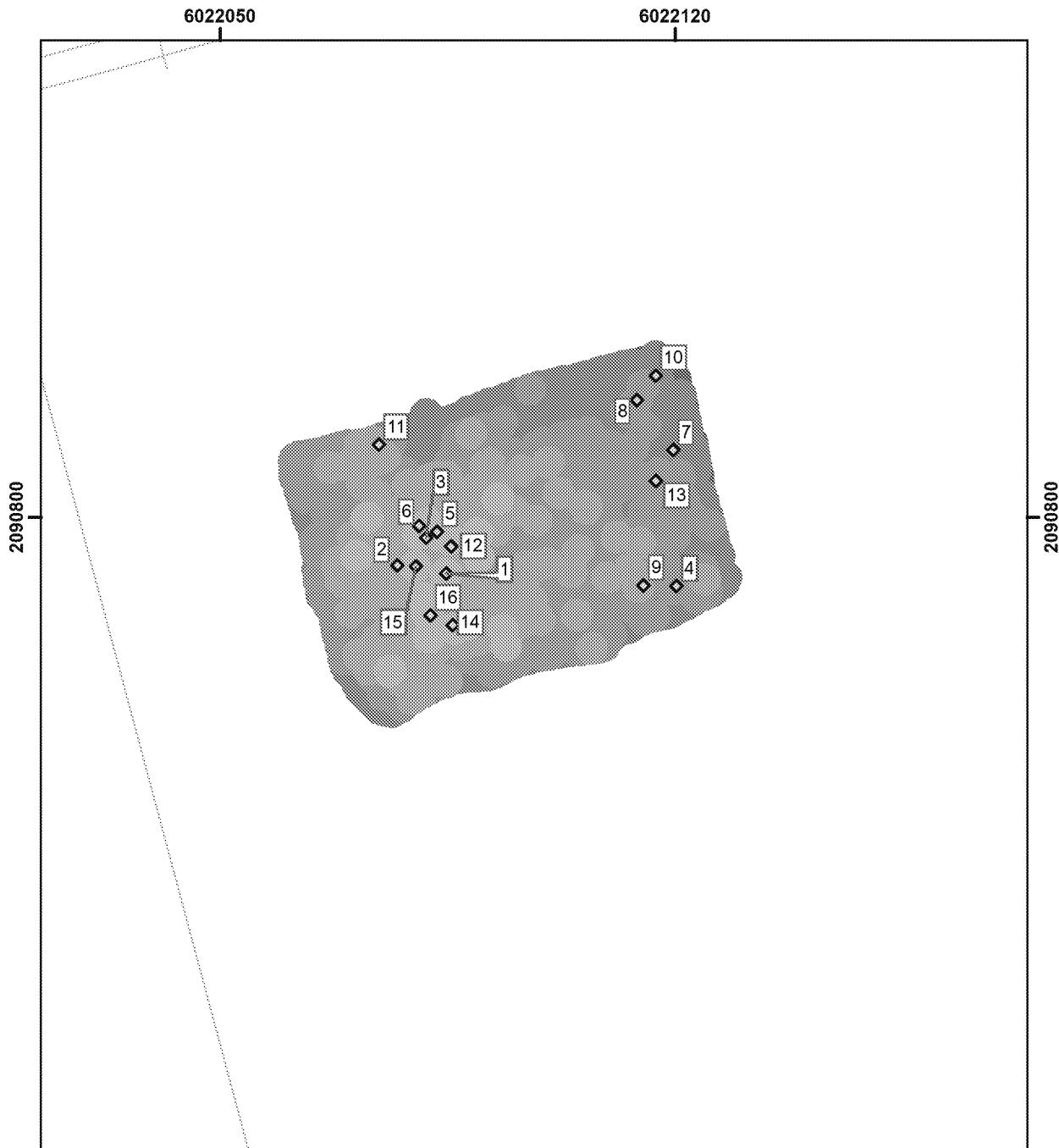
0 25 50 100  
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



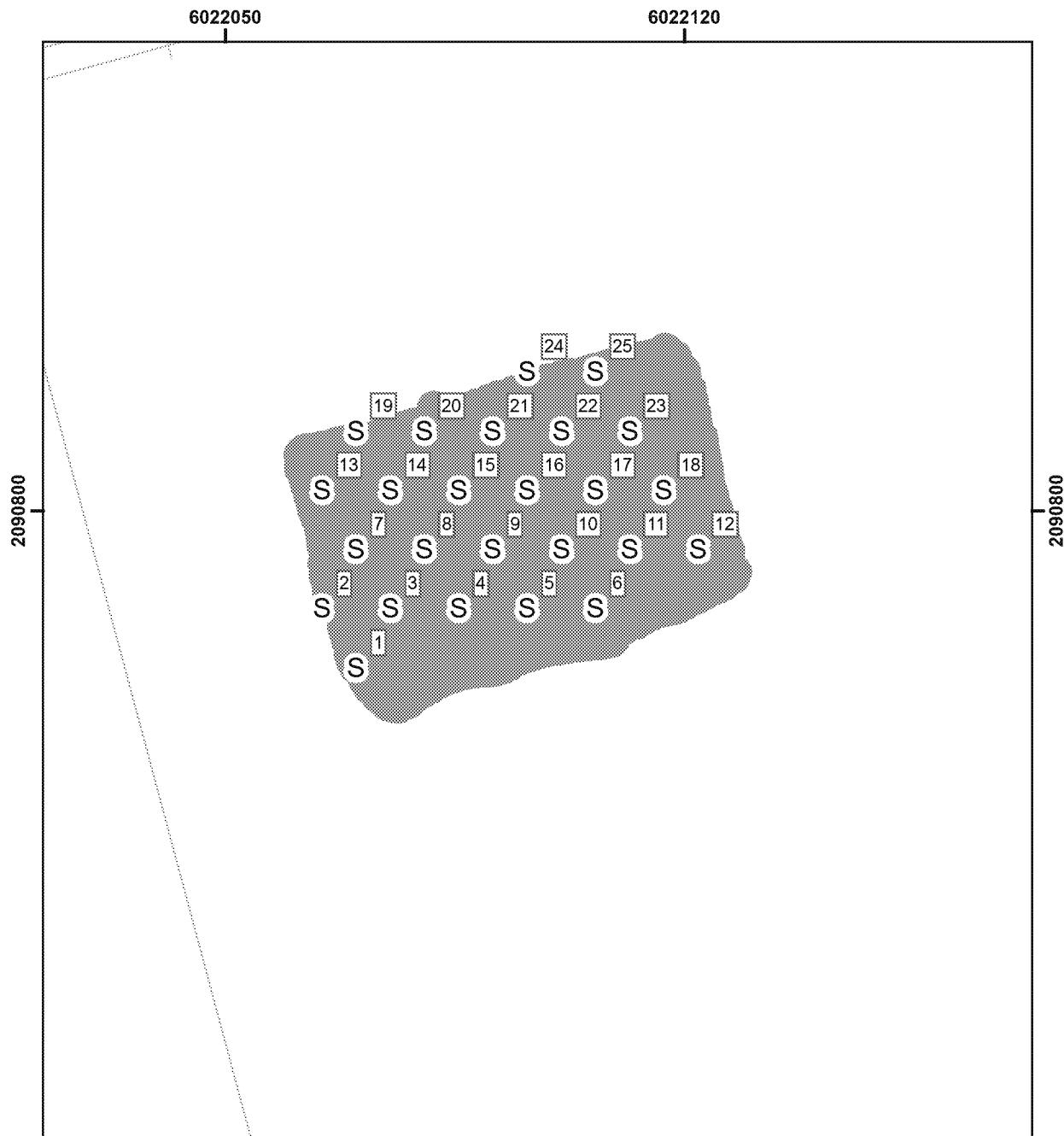
**Follow-Up Static Survey  
HPNS Parcel G  
RSY 30 Use 2**

TU-153C ESU



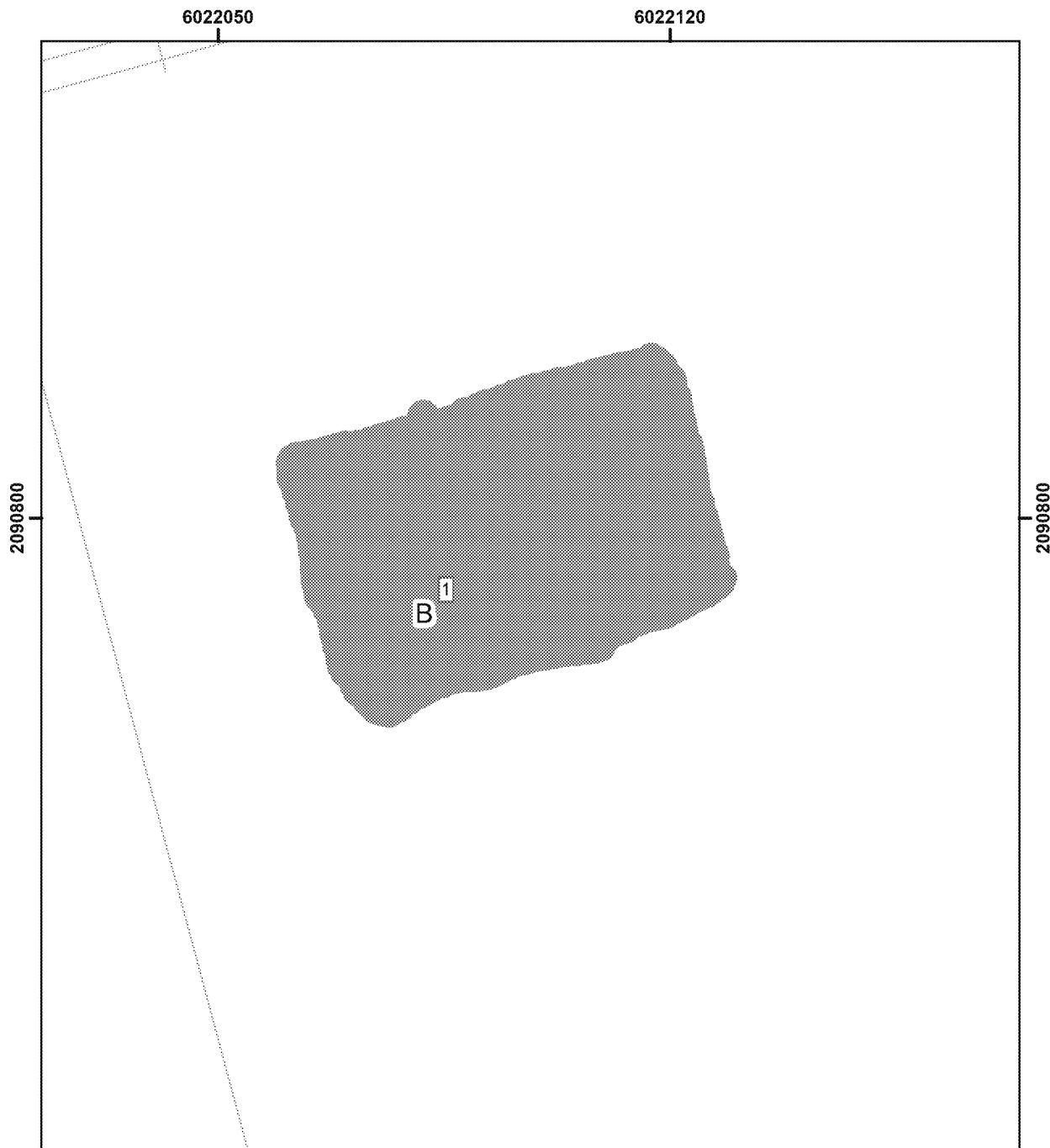
Systematic Sampling  
HPNS Parcel G  
RSY 30 Use 2

TU-153C ESU



**Biased Sampling  
HPNS Parcel G  
RSY 30 Use 2**

TU-153C ESU



**RSY 30 Use 2**

B Biased Sample Location

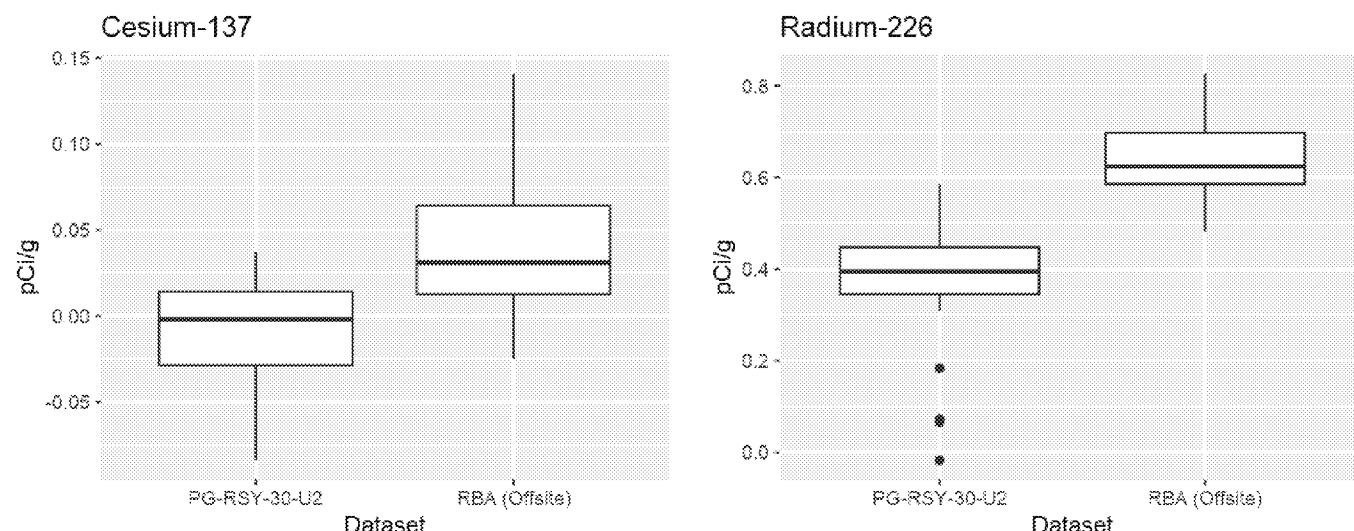
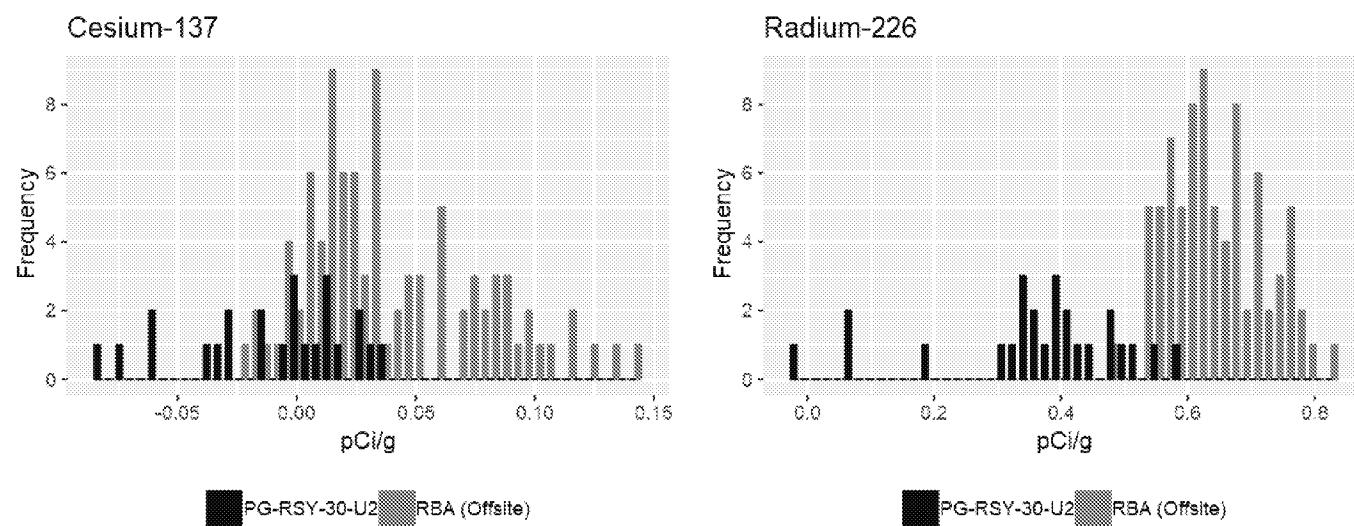
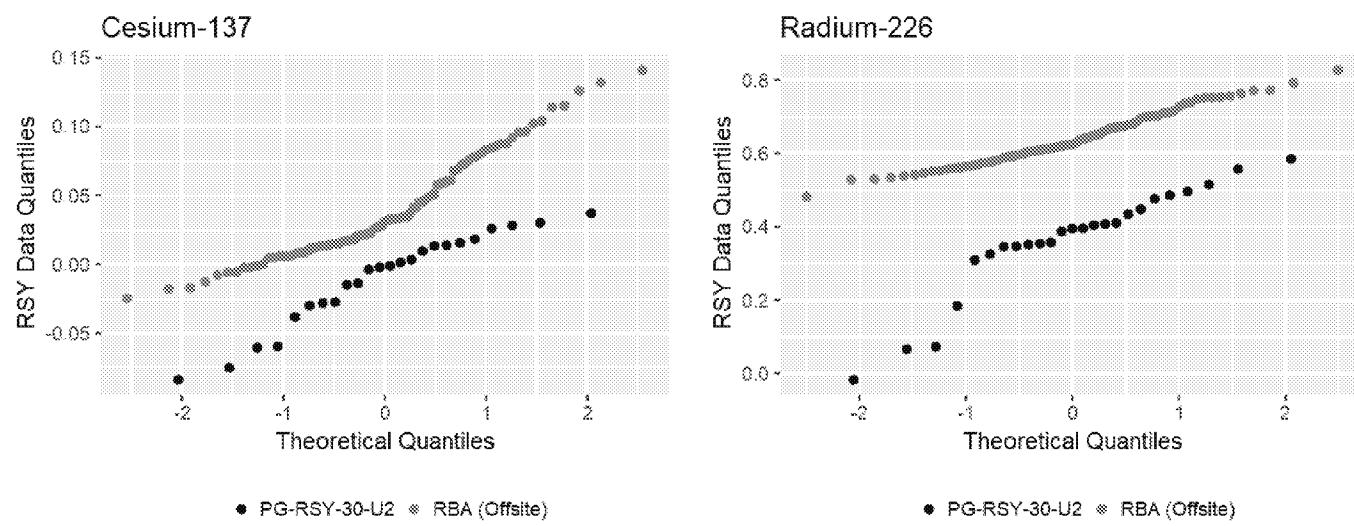
● RS-700 GWS Coverage

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



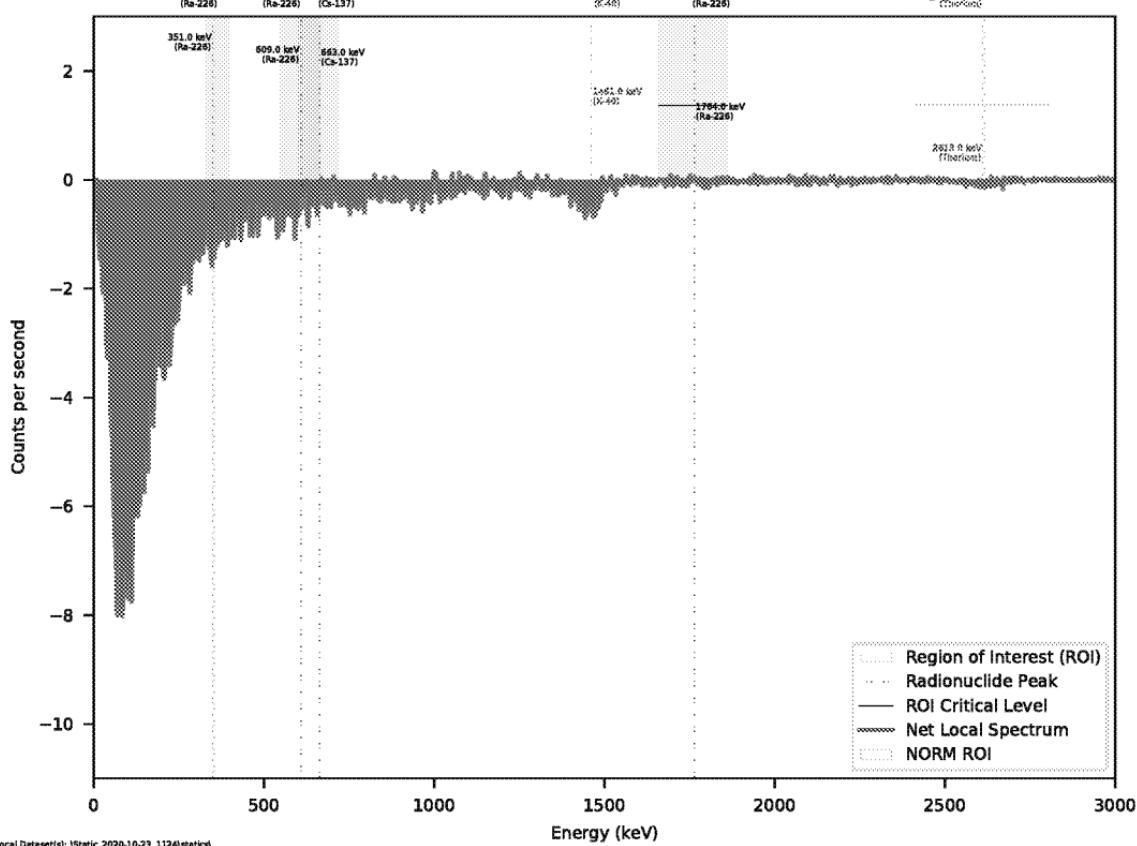
## Soil Sample Statistics





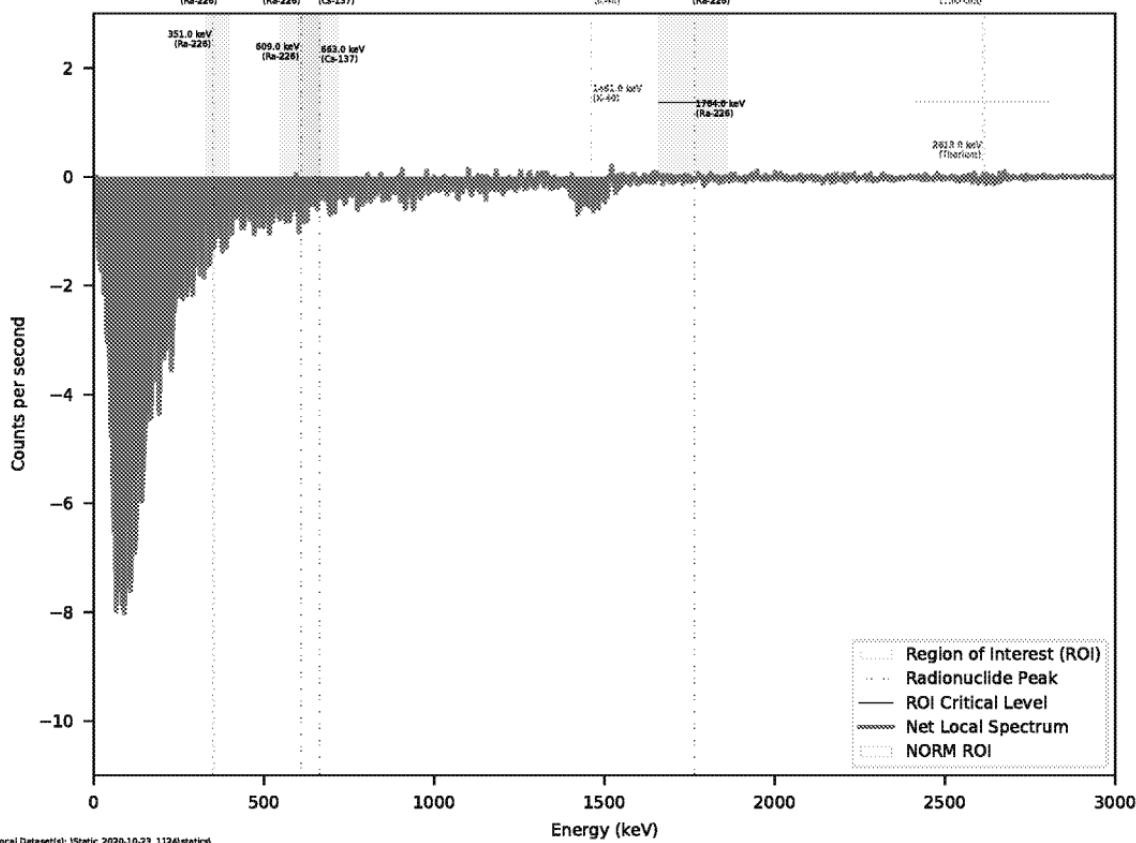
## Net Gamma Spectrum, Static Location: 1

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## Net Gamma Spectrum, Static Location: 2

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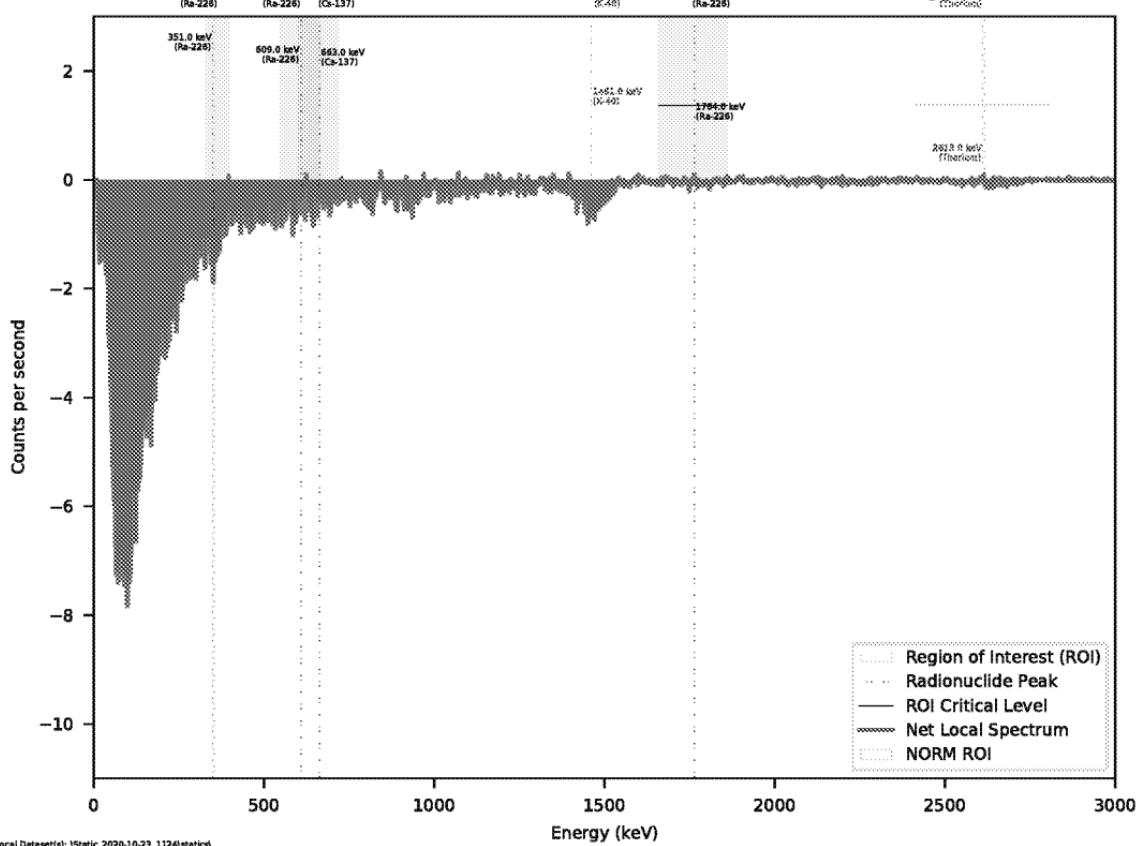
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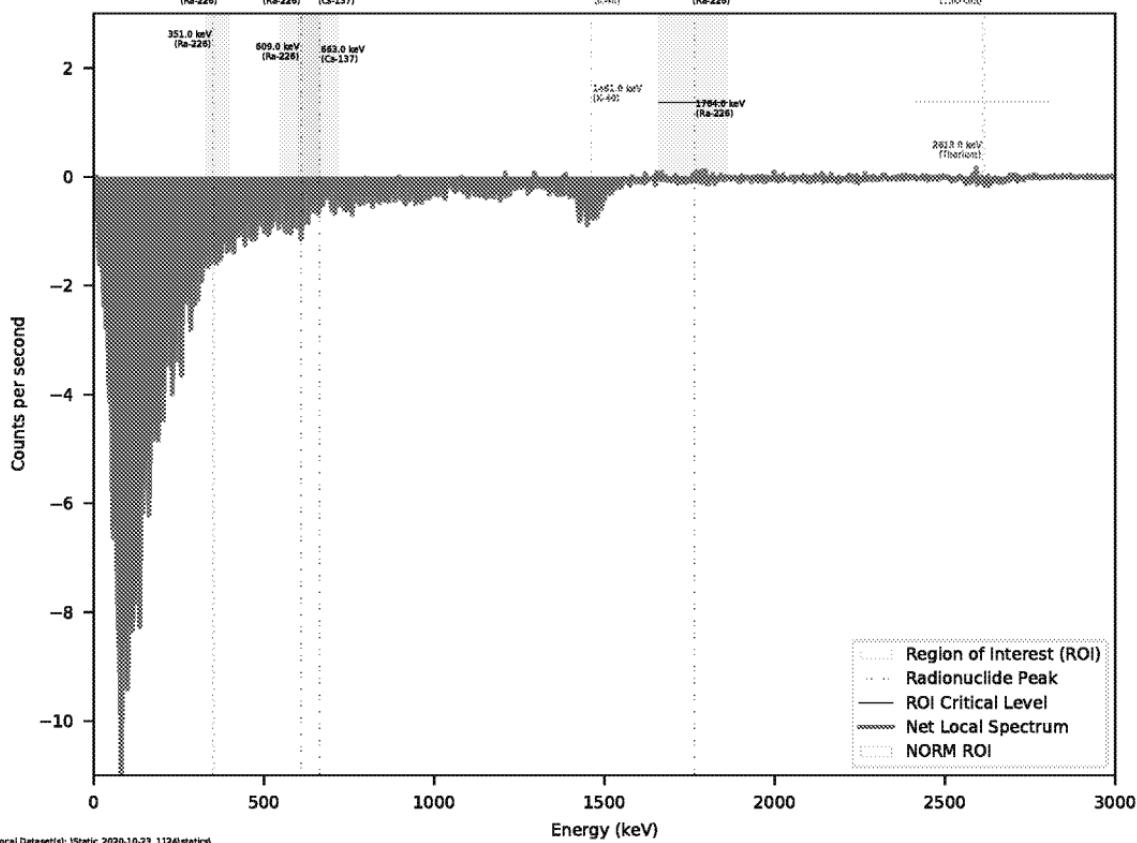
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# Net Gamma Spectrum, Static Location: 4

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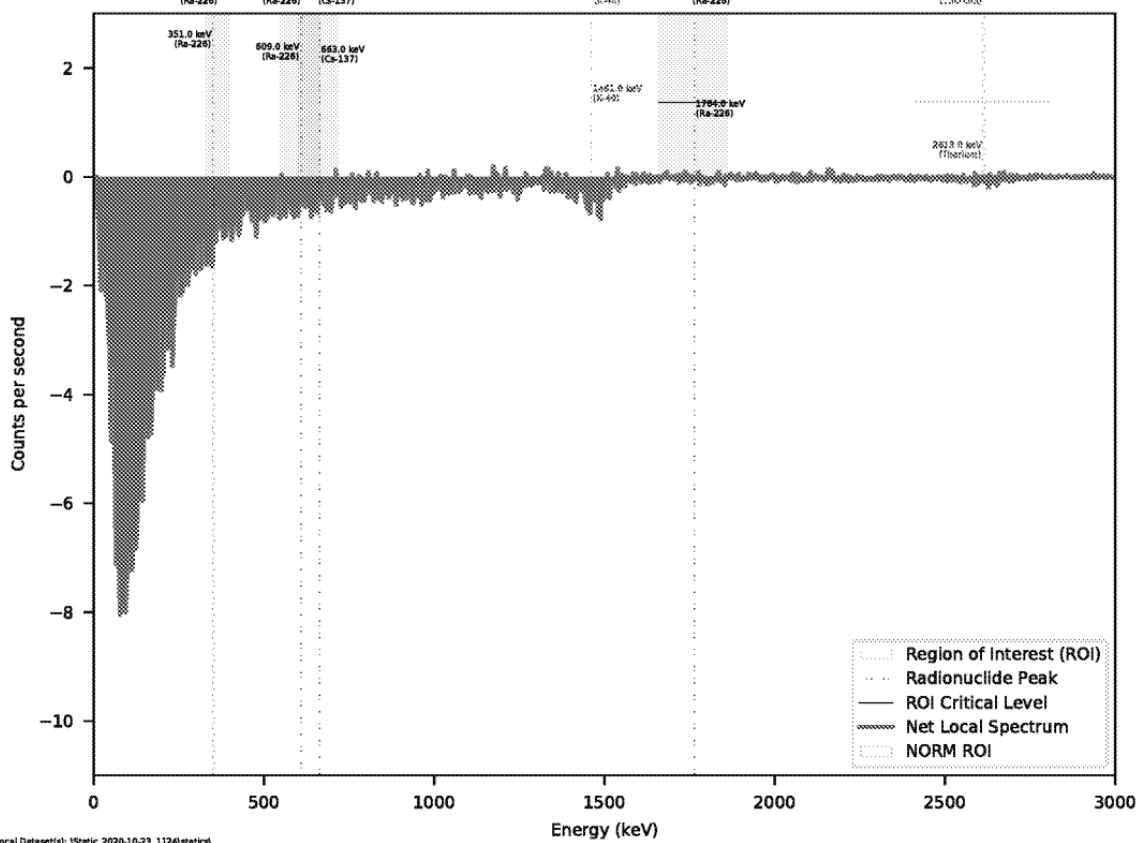
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# Net Gamma Spectrum, Static Location: 5

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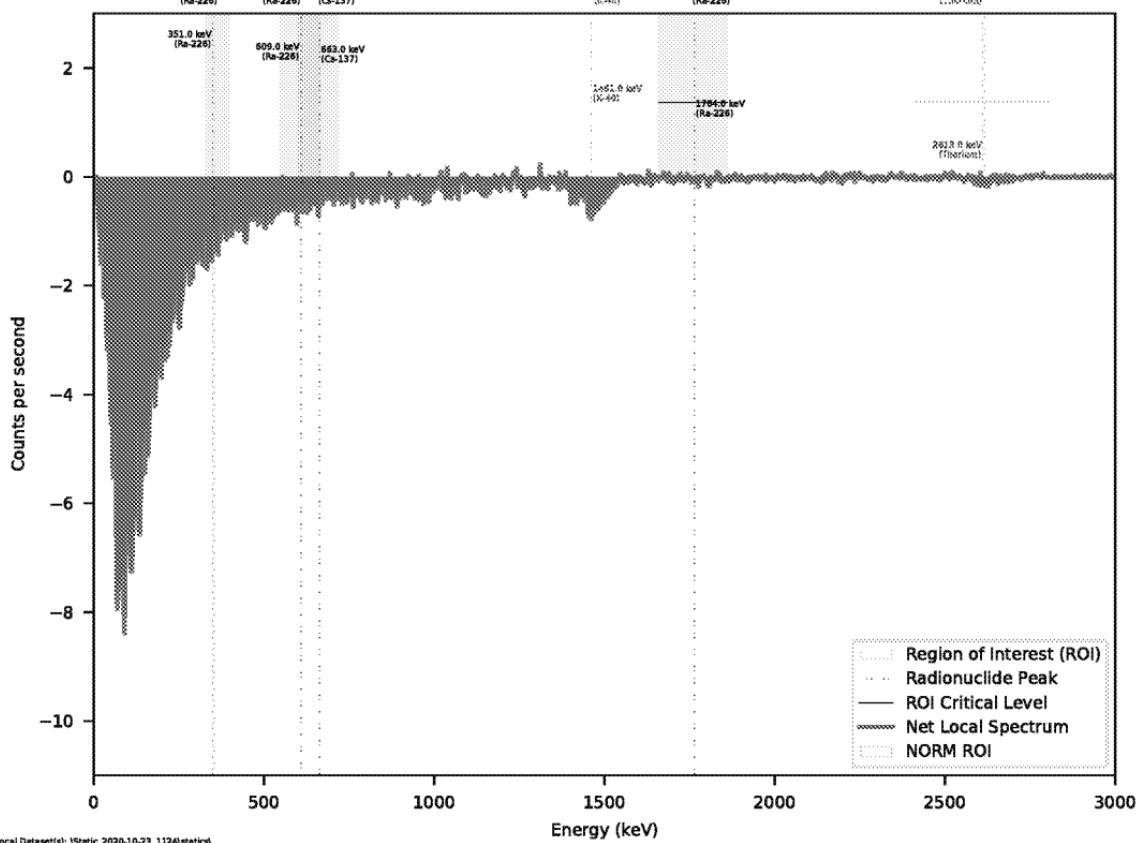
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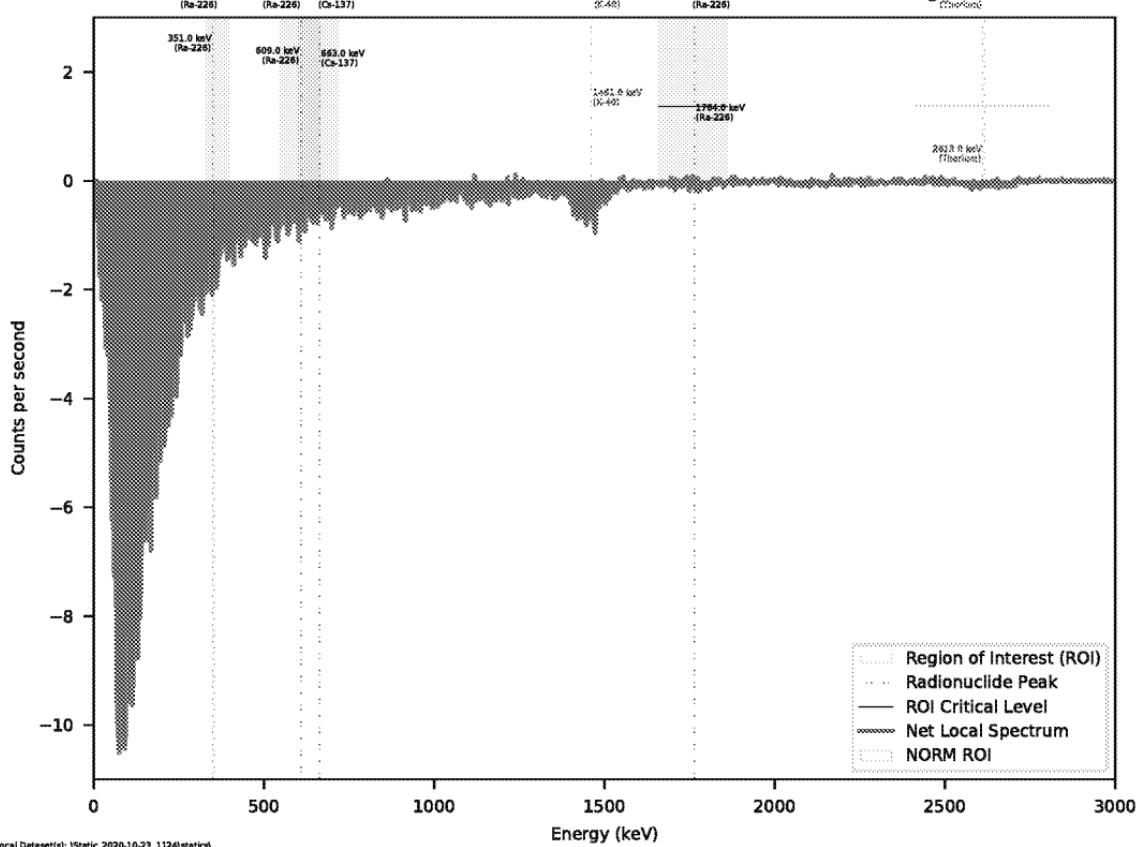
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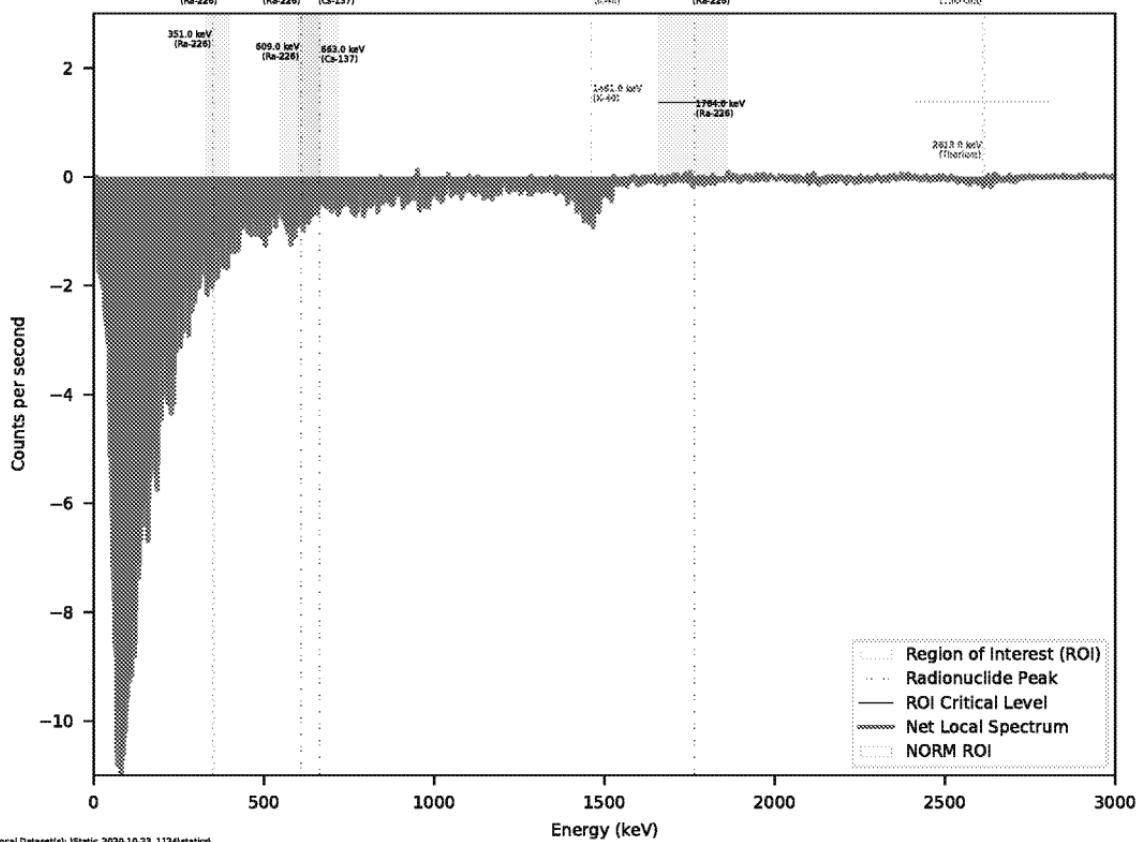
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## Net Gamma Spectrum, Static Location: 8

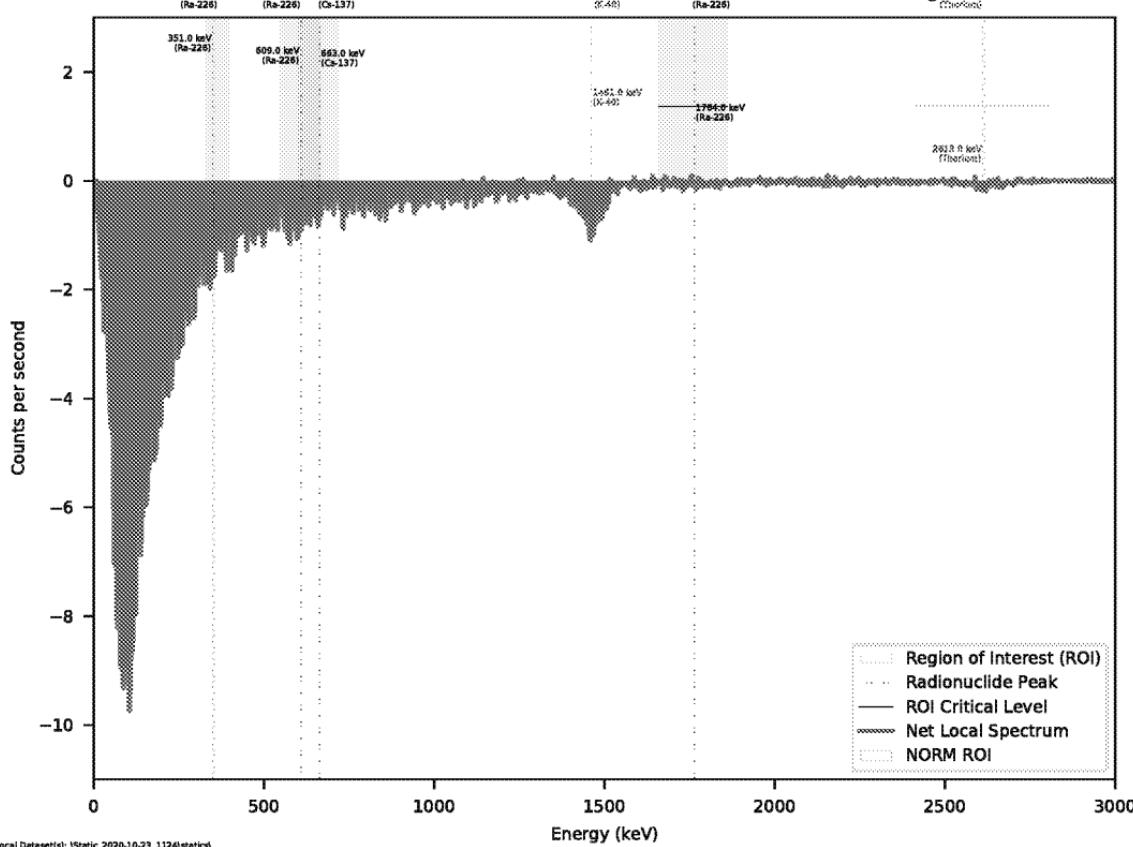
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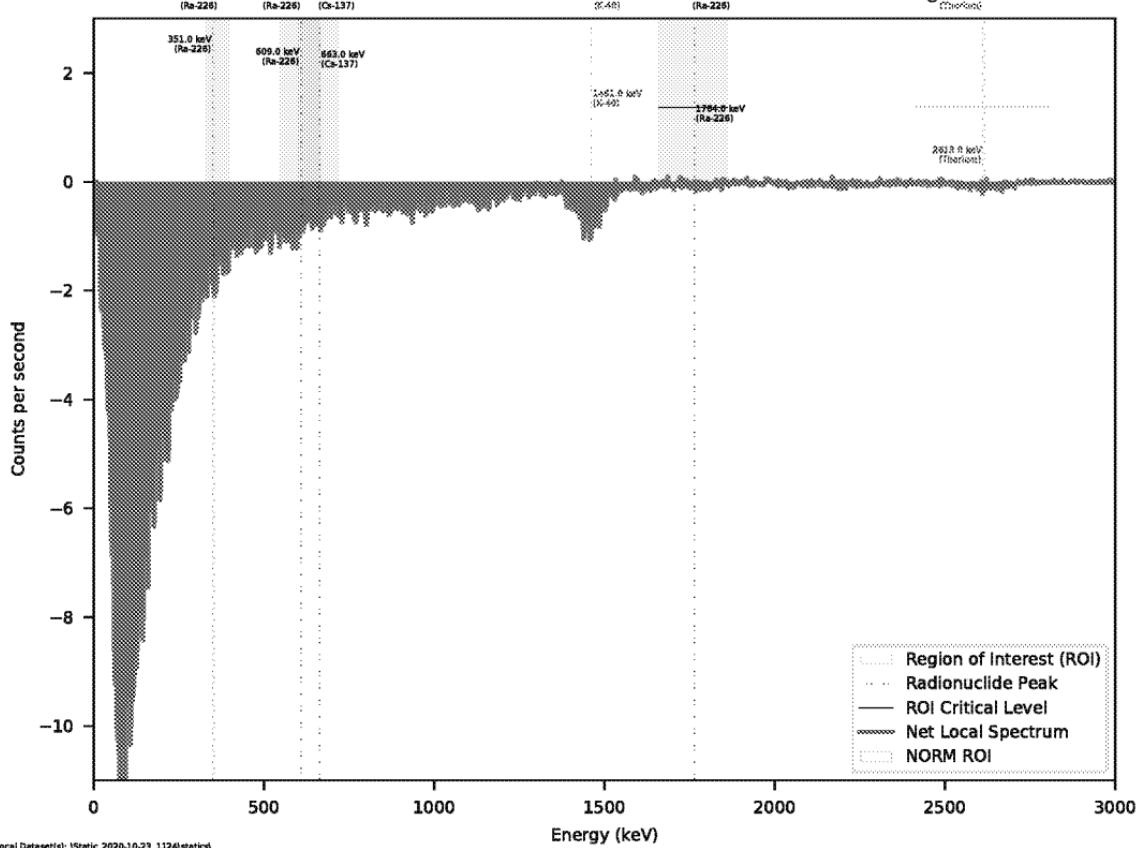
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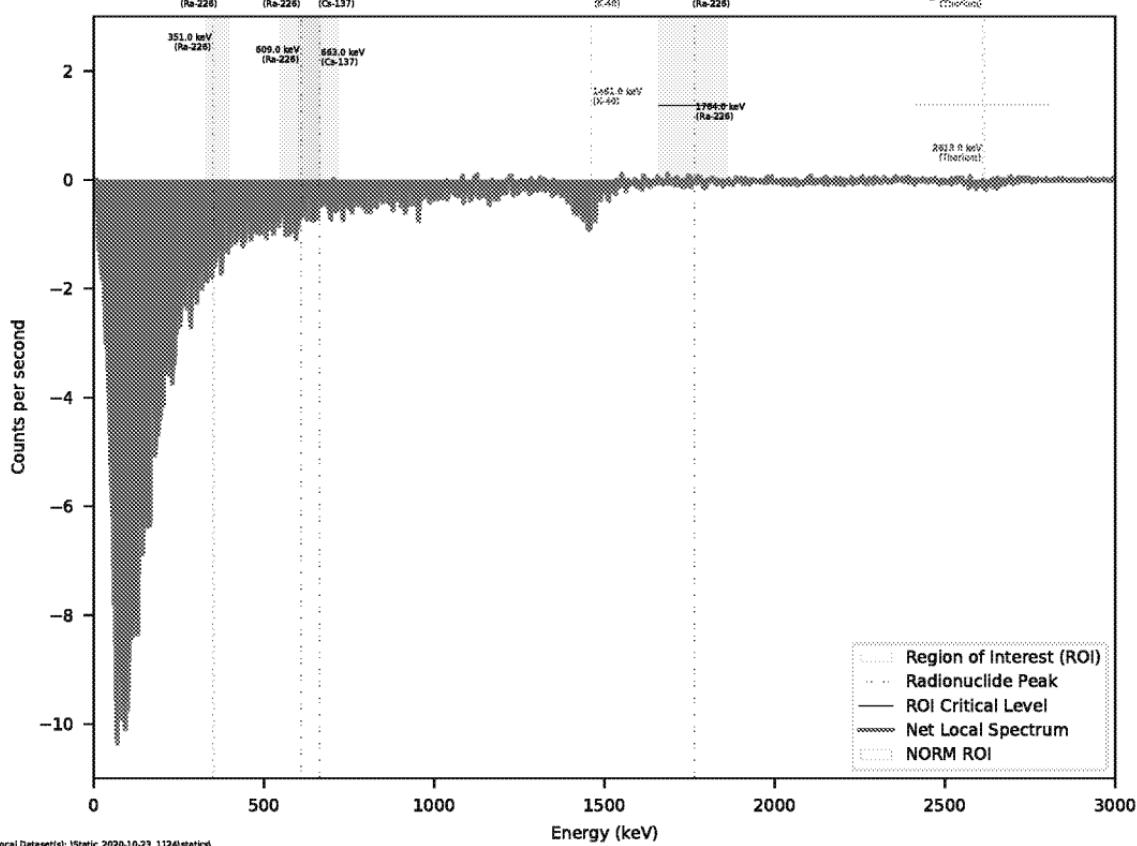
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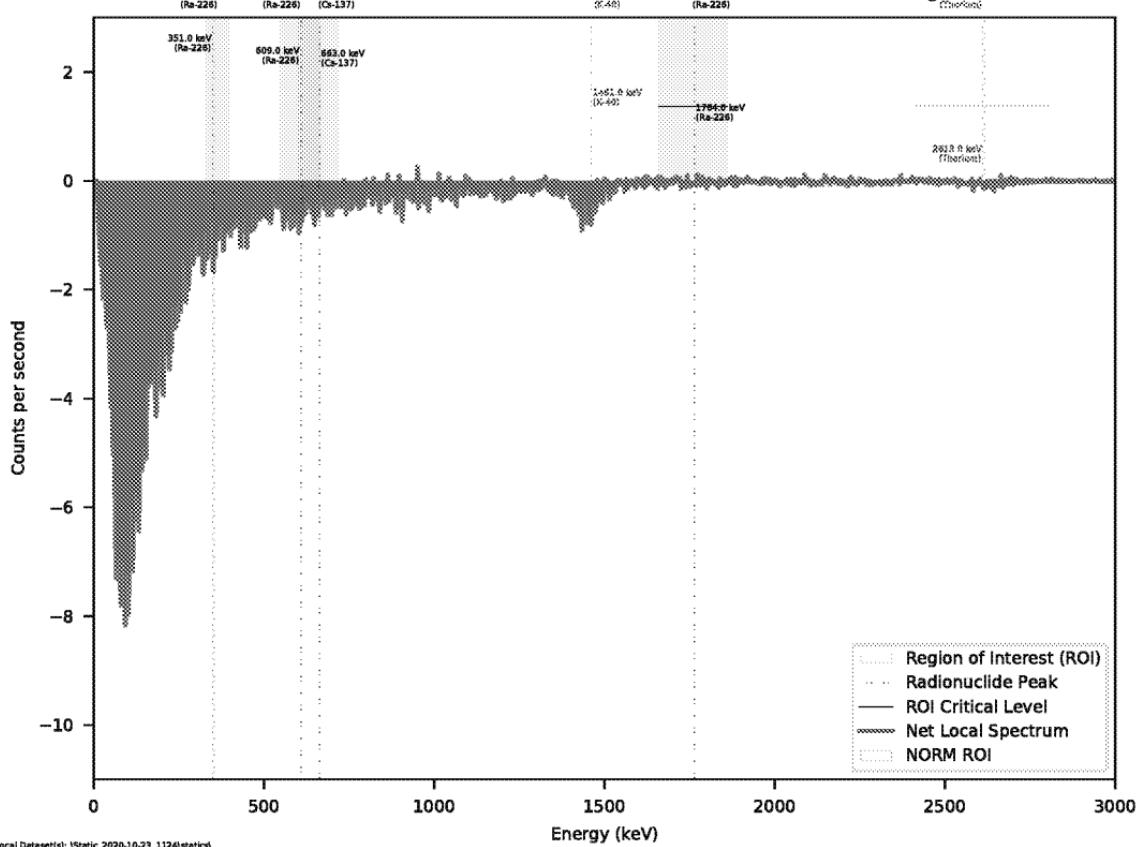
## Net Gamma Spectrum, Static Location: 11

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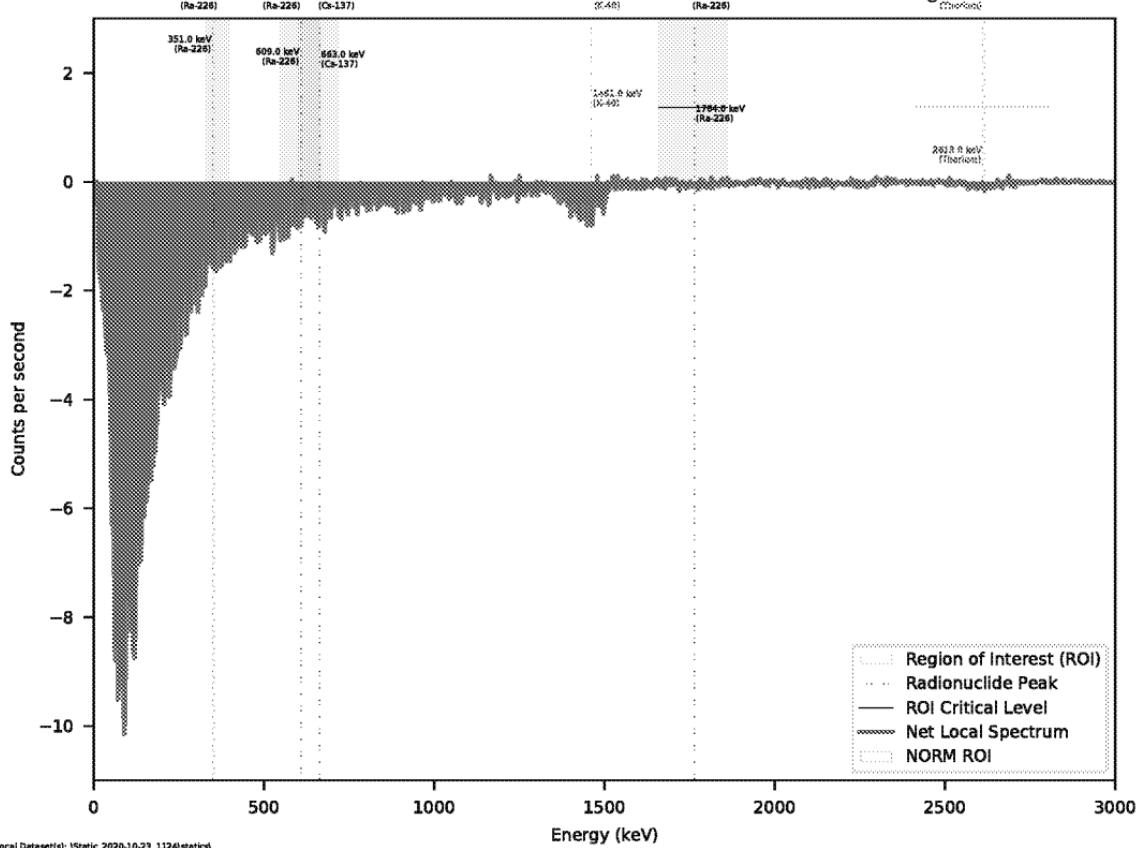
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## Net Gamma Spectrum, Static Location: 13

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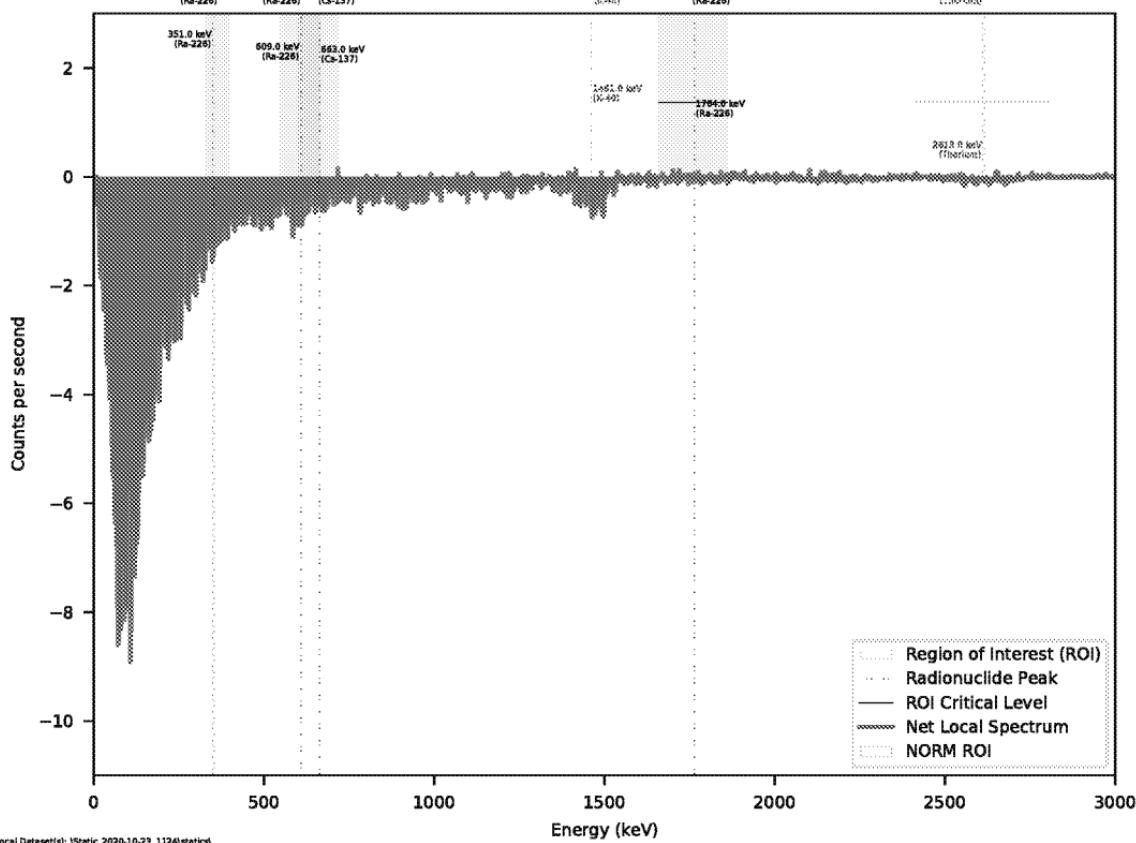
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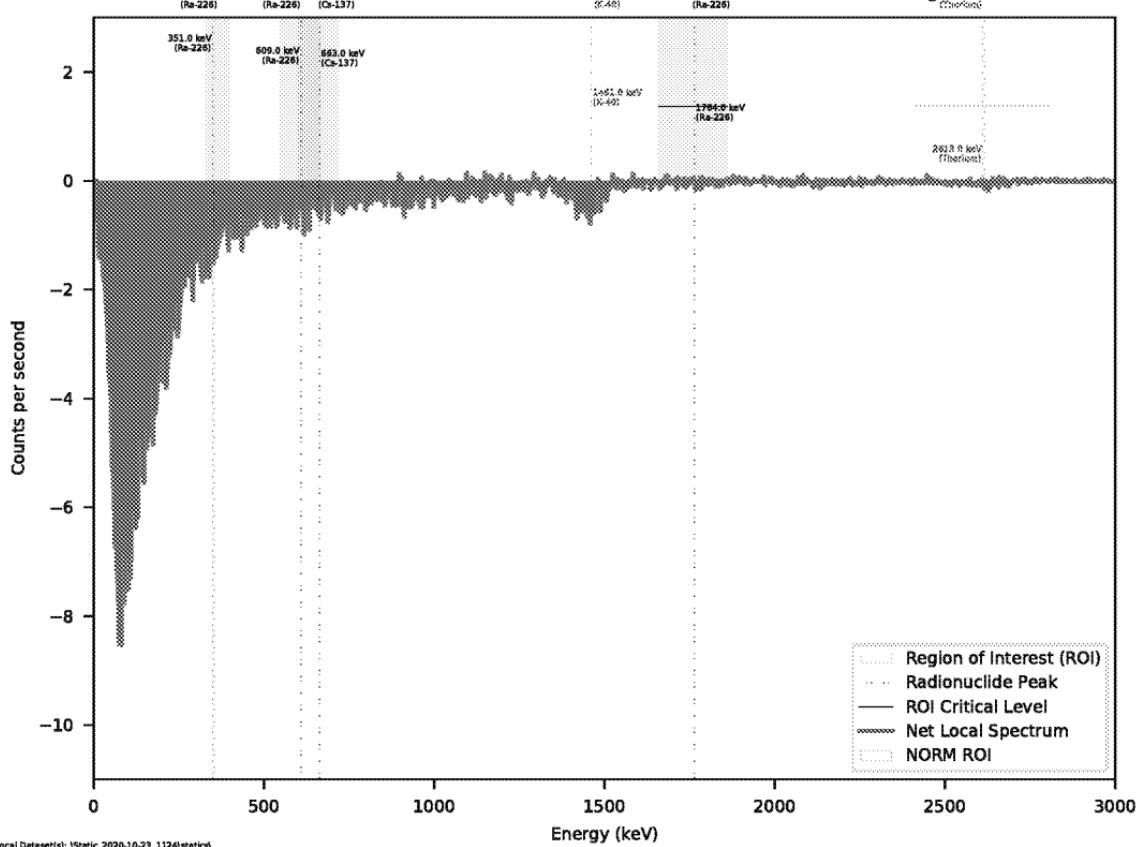
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## Net Gamma Spectrum, Static Location: 15

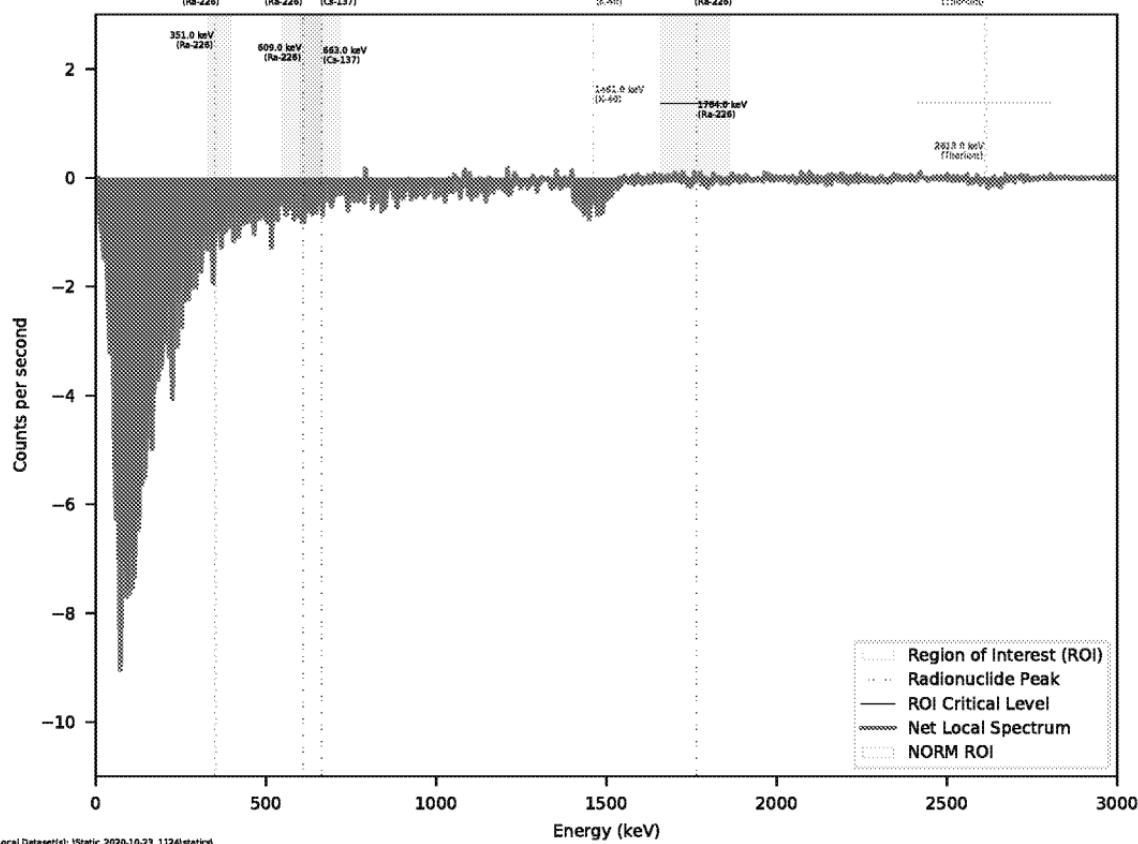
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## Net Gamma Spectrum, Static Location: 16

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Environment Testing  
America

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40090-1  
Laboratory Sample Delivery Group: GJ46599778  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

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*Authorized for release by:*  
4/13/2021 11:53:41 AM  
Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

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*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Job ID: 160-40090-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40090-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

## Job ID: 160-40090-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.9 C.

#### TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were leached on 10/27/2020, prepared on 11/06/2020 and analyzed on 01/13/2021 and 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21).

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488460/24-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/27/2020, prepared on 12/15/2020 and analyzed on 12/23/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491927/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/27/2020, prepared on 11/03/2020 and analyzed on 12/03/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-487802/1-A)

Detectors 163-170 were calibrated on 11/6 therefore no monthly calibration verification (ccv) is needed until the the following monthly check which was 12/14 for these detectors. .HPPG-ESU-TU153C-001 (160-40090-1), (LCS 160-487802/2-A), (MB 160-487802/1-A) and (160-40090-A-1-F DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-002 (160-40090-2), HPPG-ESU-TU153C-003 (160-40090-3), HPPG-ESU-TU153C-004 (160-40090-4), HPPG-ESU-TU153C-005 (160-40090-5), HPPG-ESU-TU153C-006 (160-40090-6), HPPG-ESU-TU153C-007 (160-40090-7), HPPG-ESU-TU153C-008 (160-40090-8), HPPG-ESU-TU153C-009 (160-40090-9), HPPG-ESU-TU153C-010 (160-40090-10), HPPG-ESU-TU153C-011 (160-40090-11), HPPG-ESU-TU153C-012 (160-40090-12), HPPG-ESU-TU153C-013 (160-40090-13), HPPG-ESU-TU153C-014 (160-40090-14), HPPG-ESU-TU153C-015 (160-40090-15), HPPG-ESU-TU153C-016 (160-40090-16), HPPG-ESU-TU153C-017 (160-40090-17), HPPG-ESU-TU153C-018 (160-40090-18), HPPG-ESU-TU153C-019 (160-40090-19), HPPG-ESU-TU153C-020 (160-40090-20), HPPG-ESU-TU153C-021 (160-40090-21), HPPG-ESU-TU153C-022 (160-40090-22), HPPG-ESU-TU153C-023 (160-40090-23), HPPG-ESU-TU153C-024 (160-40090-24), HPPG-ESU-TU153C-025 (160-40090-25), HPPG-F-017 (160-40090-26) and HPPG-F-018 (160-40090-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 10/27/2020, prepared on 11/02/2020 and analyzed on 11/26/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

## Job ID: 160-40090-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

#### Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

#### Gamma prep batch 487736

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.  
HPPG-ESU-TU153C-025 (160-40090-25) and HPPG-F-018 (160-40090-27)

The method blank (MB) z-score associated with Prep Batch 160-487736 is within limits and is stored in the level IV raw data. (MB 160-487736/1-A)

#### Gamma prep batch 487745

The method blank (MB) z-score associated with Prep Batch 160-487745 is within limits and is stored in the level IV raw data. (MB 160-487745/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-008 (160-40090-8), HPPG-ESU-TU153C-012 (160-40090-12) and (160-40090-A-19-C DU)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU (160-40090-5; Pb-210, 160-40090-8; Cs-137, 160-40090-17; Th-234): HPPG-ESU-TU153C-005 (160-40090-5), HPPG-ESU-TU153C-008 (160-40090-8) and HPPG-ESU-TU153C-017 (160-40090-17). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murr  
Joaquin Ramirez

Sample ID	Collection Information				Matrix	# of Containers	Preservatives		Container Type	Preservatives (soil)	Day in growth gamma	Strontium Spec (EPA 901, 1.M) - Full 21	Isotope Pu (238, 239,240)	Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method	Spec													
HPPG-ESU-TU153C-001	10/23/2020	08:18	G	SO	1	1	16 oz. plastic jar	X		X	X			X	4	GJ46599778	
HPPG-ESU-TU153C-002	10/23/2020	08:21	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-003	10/23/2020	08:24	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-004	10/23/2020	08:28	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-005	10/23/2020	08:31	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-006	10/23/2020	08:33	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-007	10/23/2020	08:37	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	
HPPG-ESU-TU153C-008	10/23/2020	08:40	G	SO	1	1	16 oz. plastic jar	X							4	GJ46599778	

## Special Instructions:

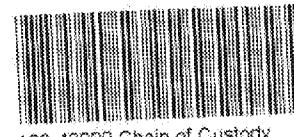
21 day ingrowth results only  
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/gTurnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By: Relinquisher Signature: Relinquish Date Time: Received By: Received Signature: Receive Date Time:

Lewis, Devin		10/23/2020 14:27	SHIPPED TO LAB VIA FE		10/26/2020 08:38
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\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



160-40090 Chain of Custody



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri  
Paul LeBlanc

Project Number: 501197

Hunters Point Naval Shipyard, Parcel  
Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/23/2020

Waybill Number: 4957 0225 4395

Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Destination:

Lab Contact Name/ph #:

Rhoeda Ridenbower (314)298-8566

Sample ID	Collection information				Matrix	# of Containments	Preservatives (water)		Preservatives (soil)		Container Type	Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method												
HPPG-ESU-TU153C-009	10/23/2020	08:44	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-010	10/23/2020	08:45	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-011	10/23/2020	08:48	G	SO	1	1	16 oz. plastic jar	X	X	X		X	4	GJ46599778	
HPPG-ESU-TU153C-012	10/23/2020	08:50	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-013	10/23/2020	08:53	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-014	10/23/2020	08:56	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-015	10/23/2020	08:58	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-016	10/23/2020	09:00	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-017	10/23/2020	09:03	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-018	10/23/2020	09:06	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-019	10/23/2020	09:10	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-020	10/23/2020	09:10	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-021	10/23/2020	09:11	G	SO	1	1	16 oz. plastic jar	X	X	X		X	4	GJ46599778	
HPPG-ESU-TU153C-022	10/23/2020	09:12	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-023	10/23/2020	09:13	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-024	10/23/2020	09:15	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-025	10/23/2020	09:17	G	SO	1	1	16 oz. plastic jar	X					4	GJ46599778	



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri  
Paul LeBlanc

Collection Information				# of Containers	Matrix	Preservatives		Container Type	Comments	Evidence Bag ID	Dose Rate R/Hr	Isotope Pu (238, 239Pu)	Analysis Requested
Sample ID	Date	Time	Method			Preservatives (water)	Preservatives (soil)						
HPPG-F-017	10/23/2020	08:37	G	SO	1	16 oz. plastic jar		X			4	GJ46599778	
HPPG-F-018	10/23/2020	09:10	G	SO	1	16 oz. plastic jar		X			4	GJ46599778	



## All Transfers for COC 501197RSY-016

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:27	SHIPPED TO LAB Via FE		10/26/2020 08:38

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40090-1  
SDG Number: GJ46599778**Login Number:** 40090**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Korrinhizer, Micha L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy

None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40090-1	HPPG-ESU-TU153C-001	Solid	10/23/20 08:18	10/26/20 08:38	
160-40090-2	HPPG-ESU-TU153C-002	Solid	10/23/20 08:21	10/26/20 08:38	
160-40090-3	HPPG-ESU-TU153C-003	Solid	10/23/20 08:24	10/26/20 08:38	
160-40090-4	HPPG-ESU-TU153C-004	Solid	10/23/20 08:28	10/26/20 08:38	
160-40090-5	HPPG-ESU-TU153C-005	Solid	10/23/20 08:31	10/26/20 08:38	
160-40090-6	HPPG-ESU-TU153C-006	Solid	10/23/20 08:33	10/26/20 08:38	
160-40090-7	HPPG-ESU-TU153C-007	Solid	10/23/20 08:37	10/26/20 08:38	
160-40090-8	HPPG-ESU-TU153C-008	Solid	10/23/20 08:40	10/26/20 08:38	
160-40090-9	HPPG-ESU-TU153C-009	Solid	10/23/20 08:44	10/26/20 08:38	
160-40090-10	HPPG-ESU-TU153C-010	Solid	10/23/20 08:45	10/26/20 08:38	
160-40090-11	HPPG-ESU-TU153C-011	Solid	10/23/20 08:48	10/26/20 08:38	
160-40090-12	HPPG-ESU-TU153C-012	Solid	10/23/20 08:50	10/26/20 08:38	
160-40090-13	HPPG-ESU-TU153C-013	Solid	10/23/20 08:53	10/26/20 08:38	
160-40090-14	HPPG-ESU-TU153C-014	Solid	10/23/20 08:56	10/26/20 08:38	
160-40090-15	HPPG-ESU-TU153C-015	Solid	10/23/20 08:58	10/26/20 08:38	
160-40090-16	HPPG-ESU-TU153C-016	Solid	10/23/20 09:00	10/26/20 08:38	
160-40090-17	HPPG-ESU-TU153C-017	Solid	10/23/20 09:03	10/26/20 08:38	
160-40090-18	HPPG-ESU-TU153C-018	Solid	10/23/20 09:06	10/26/20 08:38	
160-40090-19	HPPG-ESU-TU153C-019	Solid	10/23/20 09:10	10/26/20 08:38	
160-40090-20	HPPG-ESU-TU153C-020	Solid	10/23/20 09:10	10/26/20 08:38	
160-40090-21	HPPG-ESU-TU153C-021	Solid	10/23/20 09:11	10/26/20 08:38	
160-40090-22	HPPG-ESU-TU153C-022	Solid	10/23/20 09:12	10/26/20 08:38	
160-40090-23	HPPG-ESU-TU153C-023	Solid	10/23/20 09:13	10/26/20 08:38	
160-40090-24	HPPG-ESU-TU153C-024	Solid	10/23/20 09:15	10/26/20 08:38	
160-40090-25	HPPG-ESU-TU153C-025	Solid	10/23/20 09:17	10/26/20 08:38	
160-40090-26	HPPG-F-017	Solid	10/23/20 08:37	10/26/20 08:38	
160-40090-27	HPPG-F-018	Solid	10/23/20 09:10	10/26/20 08:38	

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-001**

**Lab Sample ID: 160-40090-1**

Matrix: Solid

Date Collected: 10/23/20 08:18  
Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.0255	U	0.0600	0.0600	0.160	0.0514	pCi/g	11/06/20 11:01	11/26/20 10:43	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	88.5		40 - 110					11/06/20 11:01	11/26/20 10:43	1

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	-0.0141	U	0.0121	0.0121	0.100	0.0133	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.0141	U	0.0121	0.0122	0.100	0.0133	pCi/g	12/15/20 12:11	12/23/20 14:28	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Pu-242 (T)	87.6		30 - 110					12/15/20 12:11	12/23/20 14:28	1

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.415		0.0603	0.0696	0.250	0.00707	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0294		0.0177	0.0179	0.100	0.00622	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.352		0.0556	0.0629	0.250	0.00705	pCi/g	11/03/20 12:03	12/03/20 16:16	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Uranium-232	80.8		30 - 110					11/03/20 12:03	12/03/20 16:16	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.0449	U	0.207	0.207	0.361	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Actinium 228</b>	<b>0.364</b>		0.133	0.138	0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Bismuth-212	-0.122	U	1.06	1.06	0.858	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Bismuth-214</b>	<b>0.396</b>		0.129	0.136	0.0506	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Cesium-137	-0.0751	U	0.0815	0.0819	0.0700	0.0791	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Lead-210	-0.121	U	1.47	1.47	1.04	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Lead-212</b>	<b>0.361</b>		0.0822	0.0945	0.0273	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Lead-214</b>	<b>0.391</b>		0.126	0.132	0.0655	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Potassium-40</b>	<b>8.42</b>		1.59	1.81	0.280	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Protactinium-231	0.620	U	1.89	1.89	2.08	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Protactinium-234	-0.103	U	0.100	0.101	0.214	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Radium-226</b>	<b>0.396</b>		0.129	0.136	0.0506	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Radium-228</b>	<b>0.364</b>		0.133	0.138	0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Thallium-208</b>	<b>0.119</b>		0.0578	0.0591	0.0234	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Thorium-232</b>	<b>0.364</b>		0.133	0.138	0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Thorium-234	0.267	U	0.511	0.511	0.401	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
<b>Thorium 228</b>	<b>0.361</b>		0.0822	0.0945	0.0273	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Uranium-235	-0.187	U	0.153	0.154	0.358	pCi/g	11/02/20 16:42	11/26/20 15:15	1	
Uranium-238	0.267	U	0.511	0.511	0.401	pCi/g	11/02/20 16:42	11/26/20 15:15	1	

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-002**

**Lab Sample ID: 160-40090-2**

Date Collected: 10/23/20 08:21

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.116	U	0.338	0.338		0.319	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Actinium 228</b>	<b>0.341</b>		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Bismuth-212	0.456	U	0.907	0.908		0.719	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Bismuth-214</b>	<b>0.476</b>		0.105	0.116		0.0351	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Cesium-137	0.0138	U	0.0630	0.0631	0.0700	0.0509	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Lead-210	-0.714	U		1.58		1.27	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Lead-212</b>	<b>0.436</b>		0.0853	0.102		0.0424	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Lead-214</b>	<b>0.463</b>		0.0878	0.100		0.0383	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Potassium-40</b>	<b>7.46</b>		1.15	1.38		0.268	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Protactinium-231	0.527	U		1.59		1.74	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Protactinium-234	0.0644	U	0.0994	0.0997		0.245	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Radium-226</b>	<b>0.476</b>		0.105	0.116	0.200	0.0351	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Radium-228</b>	<b>0.341</b>		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Thallium-208</b>	<b>0.176</b>		0.0485	0.0518		0.0138	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Thorium-232</b>	<b>0.341</b>		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Thorium-234	-0.372	U		0.422		0.973	pCi/g	11/02/20 16:42	11/26/20 15:16	1
<b>Thorium 228</b>	<b>0.436</b>		0.0853	0.102		0.0424	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Uranium-235	0.202	U		0.378		0.382	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Uranium-238	-0.372	U		0.422		0.973	pCi/g	11/02/20 16:42	11/26/20 15:16	1

**Client Sample ID: HPPG-ESU-TU153C-003**

**Lab Sample ID: 160-40090-3**

Date Collected: 10/23/20 08:24

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.380	U	0.721	0.722		0.436	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Actinium 228</b>	<b>0.193</b>		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Bismuth-212	-0.0807	U	0.823	0.823		0.671	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Bismuth-214</b>	<b>0.387</b>		0.152	0.157		0.0669	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Cesium-137	-0.0300	U	0.0657	0.0658	0.0700	0.0516	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Lead-210	-0.886	U		1.62		1.37	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Lead-212</b>	<b>0.450</b>		0.0915	0.103		0.0440	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Lead-214</b>	<b>0.372</b>		0.102	0.108		0.0601	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Potassium-40</b>	<b>8.82</b>		1.30	1.58		0.112	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Protactinium-231	0.446	U		1.76		2.22	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Protactinium-234	-0.0118	U	0.0277	0.0277		0.257	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Radium-226</b>	<b>0.387</b>		0.152	0.157	0.200	0.0669	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Radium-228</b>	<b>0.193</b>		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Thallium-208</b>	<b>0.131</b>		0.0511	0.0528		0.0180	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Thorium-232</b>	<b>0.193</b>		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Thorium-234	-0.414	U		1.00		0.838	pCi/g	11/02/20 16:42	11/26/20 15:17	1
<b>Thorium 228</b>	<b>0.450</b>		0.0915	0.103		0.0440	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Uranium-235	-0.189	U		0.565		0.460	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Uranium-238	-0.414	U		1.00		0.838	pCi/g	11/02/20 16:42	11/26/20 15:17	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-004**

**Lab Sample ID: 160-40090-4**

Date Collected: 10/23/20 08:28

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.188	U	0.406	0.406		0.233	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Actinium 228</b>	<b>0.488</b>		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Bismuth-212	0.360	U	0.676	0.677		0.531	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Bismuth-214</b>	<b>0.345</b>		0.0856	0.0928		0.0322	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Cesium-137	0.0181	U	0.0340	0.0341	0.0700	0.0259	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Lead-210	0.466	U	0.857	0.858		0.675	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Lead-212	0.0444	U	0.102	0.102		0.0823	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Lead-214</b>	<b>0.446</b>		0.105	0.115		0.0392	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Potassium-40</b>	<b>8.87</b>		1.11	1.43		0.0810	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Protactinium-231	-0.666	U	2.03	2.03		1.65	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Protactinium-234	-0.0820	U	0.230	0.230		0.187	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Radium-226</b>	<b>0.345</b>		0.0856	0.0928	0.200	0.0322	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Radium-228</b>	<b>0.488</b>		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Thallium-208</b>	<b>0.139</b>		0.0378	0.0404		0.00820	pCi/g	11/02/20 16:42	11/26/20 15:18	1
<b>Thorium-232</b>	<b>0.488</b>		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thorium-234	0.0314	U	0.0605	0.0606		0.784	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thorium 228	0.0444	U	0.102	0.102		0.0823	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Uranium-235	0.0855	U	0.171	0.171		0.332	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Uranium-238	0.0314	U	0.0605	0.0606		0.784	pCi/g	11/02/20 16:42	11/26/20 15:18	1

**Client Sample ID: HPPG-ESU-TU153C-005**

**Lab Sample ID: 160-40090-5**

Date Collected: 10/23/20 08:31

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.311	U	0.503	0.504		0.329	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Actinium 228	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Bismuth-212	0.269	U	0.732	0.733		0.574	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Bismuth-214</b>	<b>0.448</b>		0.182	0.188		0.0725	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Cesium-137	-0.00130	U	0.0617	0.0617	0.0700	0.0507	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Lead-210	-1.71	U	1.12	1.14		1.59	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Lead-212</b>	<b>0.402</b>		0.113	0.125		0.0488	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Lead-214</b>	<b>0.324</b>		0.144	0.147		0.102	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Potassium-40</b>	<b>7.78</b>		1.39	1.60		0.144	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Protactinium-231	0.630	U	2.42	2.43		1.97	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Protactinium-234	0.0601	U	0.0491	0.0495		0.244	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Radium-226</b>	<b>0.448</b>		0.182	0.188	0.200	0.0725	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Radium-228	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Thallium-208</b>	<b>0.165</b>		0.0629	0.0652		0.0241	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thorium-232	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thorium-234	-0.491	U	0.585	0.587		1.04	pCi/g	11/02/20 16:42	11/26/20 15:19	1
<b>Thorium 228</b>	<b>0.402</b>		0.113	0.125		0.0488	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Uranium-235	-0.0205	U	0.313	0.313		0.422	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Uranium-238	-0.491	U	0.585	0.587		1.04	pCi/g	11/02/20 16:42	11/26/20 15:19	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-006**

**Lab Sample ID: 160-40090-6**

Matrix: Solid

Date Collected: 10/23/20 08:33  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.306		0.462	0.463		0.290	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Actinium 228	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Bismuth-212	0.0422	U	1.09	1.09		0.898	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Bismuth-214	0.515		0.144	0.154		0.0453	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Cesium-137	-0.0138	U	0.0651	0.0651	0.0700	0.0661	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-210	-0.973	U	1.90	1.91		1.60	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-212	0.444		0.0886	0.100		0.0365	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-214	0.412		0.109	0.117		0.0431	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Potassium-40	9.84		1.65	1.93		0.235	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Protactinium-231	0.000	U	0.346	0.346		2.23	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Protactinium-234	0.0841	U	0.261	0.261		0.212	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Radium-226	0.515		0.144	0.154	0.200	0.0453	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Radium-228	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thallium-208	0.115		0.0924	0.0931		0.0423	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium-232	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium-234	0.274	U	0.562	0.563		0.455	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium 228	0.444		0.0886	0.100		0.0365	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Uranium-235	0.00369	U	0.0169	0.0169		0.423	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Uranium-238	0.274	U	0.562	0.563		0.455	pCi/g	11/02/20 16:42	11/26/20 15:57	1

**Client Sample ID: HPPG-ESU-TU153C-007**

**Lab Sample ID: 160-40090-7**

Matrix: Solid

Date Collected: 10/23/20 08:37  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0720	U	0.294	0.294		0.291	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Actinium 228	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-212	-0.0492	U	0.825	0.825		0.676	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-214	0.0727	U	0.157	0.158		0.146	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Cesium-137	0.00327	U	0.0520	0.0520	0.0700	0.0425	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-210	-1.15	U	1.50	1.51		1.28	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-212	0.340		0.0849	0.0956		0.0465	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-214	0.290		0.107	0.111		0.0958	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Potassium-40	7.75		1.22	1.46		0.271	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-231	0.000	U	0.325	0.325		2.10	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-234	0.0416	U	0.103	0.103		0.160	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-226	0.0727	U	0.157	0.158	0.200	0.146	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-228	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thallium-208	0.0978		0.0805	0.0811		0.0440	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-232	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-234	-0.447	U	0.482	0.484		0.712	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium 228	0.340		0.0849	0.0956		0.0465	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-235	-0.0795	U	0.225	0.225		0.229	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-238	-0.447	U	0.482	0.484		0.712	pCi/g	11/02/20 16:42	11/26/20 16:00	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-008**  
Date Collected: 10/23/20 08:40  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-8**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.181	U	0.332	0.333		0.347	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Actinium 228</b>	<b>0.556</b>		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Bismuth-212	-0.353	U	0.905	0.906		0.708	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Bismuth-214</b>	<b>0.434</b>		0.146	0.153		0.0608	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Cesium-137	-0.0838	U	0.0492	0.0499	0.0700	0.0931	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Lead-210</b>	<b>0.816</b>		1.17	1.17		0.753	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Lead-212</b>	<b>0.368</b>		0.100	0.111		0.0535	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Lead-214</b>	<b>0.344</b>		0.114	0.120		0.0759	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Potassium-40</b>	<b>8.82</b>		1.64	1.87		0.284	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Protactinium-231	0.000	U	0.204	0.204		2.14	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Protactinium-234	0.0714	U	0.199	0.200		0.168	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Radium-226</b>	<b>0.434</b>		0.146	0.153	0.200	0.0608	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Radium-228</b>	<b>0.556</b>		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Thallium-208</b>	<b>0.121</b>		0.0745	0.0755		0.0353	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Thorium-232</b>	<b>0.556</b>		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Thorium-234	-0.153	U	0.859	0.859		0.712	pCi/g	11/02/20 16:42	11/26/20 15:59	1
<b>Thorium 228</b>	<b>0.368</b>		0.100	0.111		0.0535	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Uranium-235	0.141	U	0.304	0.305		0.291	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Uranium-238	-0.153	U	0.859	0.859		0.712	pCi/g	11/02/20 16:42	11/26/20 15:59	1

**Client Sample ID: HPPG-ESU-TU153C-009**

Date Collected: 10/23/20 08:44  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-9**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.117	U	0.243	0.244		0.319	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Actinium 228</b>	<b>0.500</b>		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-212	-0.527	U	0.802	0.804		0.626	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Bismuth-214</b>	<b>0.354</b>		0.0954	0.102		0.0378	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Cesium-137	0.00130	U	0.0402	0.0402	0.0700	0.0330	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-210	-0.110	U	1.38	1.38		1.13	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Lead-212</b>	<b>0.426</b>		0.0780	0.0955		0.0350	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Lead-214</b>	<b>0.396</b>		0.0913	0.100		0.0411	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Potassium-40</b>	<b>8.61</b>		1.20	1.49		0.253	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-231	0.454	U	1.40	1.40		1.53	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-234	0.102	U	0.195	0.195		0.167	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Radium-226</b>	<b>0.354</b>		0.0954	0.102	0.200	0.0378	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Radium-228</b>	<b>0.500</b>		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Thallium-208</b>	<b>0.141</b>		0.0595	0.0613		0.0251	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Thorium-232</b>	<b>0.500</b>		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-234	-0.343	U	0.281	0.284		0.923	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Thorium 228</b>	<b>0.426</b>		0.0780	0.0955		0.0350	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-235	-0.0580	U	0.160	0.160		0.308	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-238	-0.343	U	0.281	0.284		0.923	pCi/g	11/02/20 16:42	11/26/20 16:04	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-010**  
Date Collected: 10/23/20 08:45  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-10**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.252	U	0.488	0.489		0.289	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Actinium 228</b>	<b>0.652</b>		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Bismuth-212	-0.0155	U	0.622	0.622		0.511	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Bismuth-214</b>	<b>0.357</b>		0.143	0.147		0.0686	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Cesium-137	0.0281	U	0.0549	0.0550	0.0700	0.0419	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Lead-210	-1.00	U		1.84	1.84	1.55	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Lead-212</b>	<b>0.375</b>		0.0911	0.0991		0.0452	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Lead-214</b>	<b>0.404</b>		0.120	0.126		0.0550	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Potassium-40</b>	<b>9.09</b>		1.42	1.69		0.128	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Protactinium-231	0.724	U	2.06	2.06		2.26	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Protactinium-234	-0.116	U	0.354	0.354		0.288	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Radium-226</b>	<b>0.357</b>		0.143	0.147	0.200	0.0686	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Radium-228</b>	<b>0.652</b>		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Thallium-208</b>	<b>0.211</b>		0.0623	0.0659		0.0164	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Thorium-232</b>	<b>0.652</b>		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Thorium-234	-0.990	U	0.695	0.704		0.970	pCi/g	11/02/20 16:42	11/26/20 16:02	1
<b>Thorium 228</b>	<b>0.375</b>		0.0911	0.0991		0.0452	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Uranium-235	0.0636	U	0.601	0.601		0.493	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Uranium-238	-0.990	U	0.695	0.704		0.970	pCi/g	11/02/20 16:42	11/26/20 16:02	1

**Client Sample ID: HPPG-ESU-TU153C-011**

**Lab Sample ID: 160-40090-11**

Date Collected: 10/23/20 08:48

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.0361	U	0.0562	0.0562	0.160	0.0429	pCi/g	11/06/20 11:01	01/13/21 06:54	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	91.9		40 - 110					11/06/20 11:01	01/13/21 06:54	1

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.00557	U	0.00983	0.00984	0.100	0.00611	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.00186	U	0.00831	0.00831	0.100	0.00749	pCi/g	12/15/20 12:11	12/23/20 14:28	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Pu-242 (T)	91.1		30 - 110					12/15/20 12:11	12/23/20 14:28	1

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.367		0.0569	0.0647	0.250	0.00860	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0186		0.0140	0.0141	0.100	0.00618	pCi/g	11/03/20 12:03	12/03/20 16:16	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-011**

**Lab Sample ID: 160-40090-11**

Date Collected: 10/23/20 08:48

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Uranium-238	0.479		0.0647	0.0762	0.250	0.00858	pCi/g	11/03/20 12:03	12/03/20 16:16	1
<i>Tracer</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Uranium-232	84.6		30 - 110					11/03/20 12:03	12/03/20 16:16	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium-227	0.100	U	0.217	0.217		0.277	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Actinium 228</b>	<b>0.445</b>		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-212	-0.139	U	0.581	0.581		0.466	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Bismuth-214</b>	<b>0.407</b>		0.118	0.126		0.0512	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Cesium-137	-0.0282	U	0.0510	0.0511	0.0700	0.0396	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-210	0.528	U	1.15	1.15		0.921	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Lead-212</b>	<b>0.391</b>		0.0729	0.0887		0.0319	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Lead-214</b>	<b>0.421</b>		0.0895	0.0996		0.0491	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Potassium-40</b>	<b>7.07</b>		1.04	1.27		0.0890	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-231	0.000	U	0.714	0.714		1.74	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-234	-0.0203	U	0.115	0.115		0.195	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Radium-226</b>	<b>0.407</b>		0.118	0.126	0.200	0.0512	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Radium-228</b>	<b>0.445</b>		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Thallium-208</b>	<b>0.159</b>		0.0464	0.0493		0.0142	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Thorium-232</b>	<b>0.445</b>		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-234	0.0118	U	0.0215	0.0215		0.708	pCi/g	11/02/20 16:42	11/26/20 16:00	1
<b>Thorium 228</b>	<b>0.391</b>		0.0729	0.0887		0.0319	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-235	0.0933	U	0.403	0.403		0.329	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-238	0.0118	U	0.0215	0.0215		0.708	pCi/g	11/02/20 16:42	11/26/20 16:00	1

**Client Sample ID: HPPG-ESU-TU153C-012**

**Lab Sample ID: 160-40090-12**

Date Collected: 10/23/20 08:50

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium-227	0.0328	U	0.110	0.110		0.364	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Actinium 228</b>	<b>0.404</b>		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Bismuth-212	-0.385	U	1.17	1.17		0.934	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Bismuth-214	0.0664	U	0.168	0.168		0.160	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Cesium-137	-0.0597	U	0.0952	0.0954	0.0700	0.0740	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Lead-210	0.676	U	1.43	1.43		0.915	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Lead-212</b>	<b>0.324</b>		0.0973	0.106		0.0564	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Lead-214</b>	<b>0.483</b>		0.0928	0.106		0.0130	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Potassium-40</b>	<b>7.09</b>		1.36	1.54		0.152	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Protactinium-231	0.389	U	1.43	1.43		2.27	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Protactinium-234	0.109	U	0.293	0.293		0.238	pCi/g	11/02/20 16:42	11/26/20 16:05	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-012**

**Lab Sample ID: 160-40090-12**

Date Collected: 10/23/20 08:50

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Radium-226	0.0664	U	0.168	0.168	0.200	0.160	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Radium-228</b>	<b>0.404</b>		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thallium-208	0.108		0.0751	0.0759		0.0371	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Thorium-232</b>	<b>0.404</b>		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thorium-234	-0.517	U	0.797	0.799		1.15	pCi/g	11/02/20 16:42	11/26/20 16:05	1
<b>Thorium 228</b>	<b>0.324</b>		0.0973	0.106		0.0564	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Uranium-235	0.254		0.260	0.261		0.226	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Uranium-238	-0.517	U	0.797	0.799		1.15	pCi/g	11/02/20 16:42	11/26/20 16:05	1

**Client Sample ID: HPPG-ESU-TU153C-013**

**Lab Sample ID: 160-40090-13**

Date Collected: 10/23/20 08:53

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.281	U	0.489	0.490		0.329	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Actinium 228</b>	<b>0.471</b>		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-212	0.295	U	0.729	0.729		0.571	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Bismuth-214</b>	<b>0.585</b>		0.153	0.164		0.0538	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Cesium-137	0.0301	U	0.0568	0.0569	0.0700	0.0436	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Lead-210</b>	<b>1.07</b>		1.40	1.41		0.924	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Lead-212</b>	<b>0.521</b>		0.101	0.121		0.0451	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Lead-214</b>	<b>0.420</b>		0.111	0.119		0.0617	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Potassium-40</b>	<b>9.01</b>		1.53	1.78		0.420	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-231	-0.765	U	2.95	2.95		2.40	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-234	0.103	U	0.286	0.287		0.211	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Radium-226</b>	<b>0.585</b>		0.153	0.164	0.200	0.0538	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Radium-228</b>	<b>0.471</b>		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thallium-208	0.143		0.0508	0.0529		0.0192	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Thorium-232</b>	<b>0.471</b>		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-234	-0.372	U	0.951	0.952		0.794	pCi/g	11/02/20 16:42	11/26/20 16:04	1
<b>Thorium 228</b>	<b>0.521</b>		0.101	0.121		0.0451	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-235	0.000	U	0.237	0.237		0.457	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-238	-0.372	U	0.951	0.952		0.794	pCi/g	11/02/20 16:42	11/26/20 16:04	1

**Client Sample ID: HPPG-ESU-TU153C-014**

**Lab Sample ID: 160-40090-14**

Date Collected: 10/23/20 08:56

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.369		0.384	0.386		0.214	pCi/g	11/02/20 16:42	11/26/20 16:32	1
<b>Actinium 228</b>	<b>0.505</b>		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Bismuth-212	0.447	U	0.783	0.784		0.599	pCi/g	11/02/20 16:42	11/26/20 16:32	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-014**  
Date Collected: 10/23/20 08:56  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-14**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-214	0.486		0.125	0.134		0.0427	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Cesium-137	0.0133	U	0.0653	0.0653	0.0700	0.0524	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-210	1.99		1.46	1.48		0.846	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-212	0.434		0.0881	0.0990		0.0417	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-214	0.360		0.0965	0.103		0.0507	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Potassium-40	8.29		1.44	1.67		0.213	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Protactinium-231	0.490	U	2.03	2.03		2.01	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Protactinium-234	-0.0136	U	0.0263	0.0263		0.233	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Radium-226	0.486		0.125	0.134	0.200	0.0427	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Radium-228	0.505		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thallium-208	0.219		0.0617	0.0656		0.0169	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium-232	0.505		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium-234	0.409		0.503	0.505		0.390	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium-228	0.434		0.0881	0.0990		0.0417	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Uranium-235	0.108	U	0.272	0.272		0.205	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Uranium-238	0.409		0.503	0.505		0.390	pCi/g	11/02/20 16:42	11/26/20 16:32	1

**Client Sample ID: HPPG-ESU-TU153C-015**

**Lab Sample ID: 160-40090-15**

Date Collected: 10/23/20 08:58  
Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.199	U	0.597	0.597		0.364	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Actinium-228	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-212	-0.0244	U	0.686	0.686		0.563	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-214	0.184		0.0984	0.100		0.113	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Cesium-137	-0.0383	U	0.0664	0.0665	0.0700	0.0517	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-210	1.07		1.31	1.32		0.852	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-212	0.383		0.0863	0.0995		0.0449	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-214	0.401		0.104	0.112		0.0894	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Potassium-40	8.35		1.26	1.52		0.269	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-231	0.582	U	1.86	1.86		2.03	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-234	0.114	U	0.0951	0.0958		0.164	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-226	0.184		0.0984	0.100	0.200	0.113	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-228	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thallium-208	0.138		0.0476	0.0497		0.0197	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-232	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-234	0.420		0.456	0.459		0.349	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-228	0.383		0.0863	0.0995		0.0449	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-235	0.0595	U	0.312	0.313		0.244	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-238	0.420		0.456	0.459		0.349	pCi/g	11/02/20 16:42	11/26/20 16:34	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-016**

**Lab Sample ID: 160-40090-16**

Date Collected: 10/23/20 09:00

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.288	U	0.629	0.630		0.377	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Actinium 228</b>	<b>0.202</b>		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-212	-0.403	U	0.911	0.912		0.708	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Bismuth-214</b>	<b>0.325</b>		0.141	0.145		0.0669	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Cesium-137	0.00969	U	0.0669	0.0669	0.0700	0.0536	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Lead-210</b>	<b>1.11</b>		1.01	1.02		0.636	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Lead-212</b>	<b>0.373</b>		0.0936	0.105		0.0446	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Lead-214</b>	<b>0.365</b>		0.123	0.129		0.0561	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Potassium-40</b>	<b>7.24</b>		1.48	1.66		0.279	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-231	-0.962	U	3.03	3.03		2.46	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-234	0.0490	U	0.0911	0.0913		0.161	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Radium-226</b>	<b>0.325</b>		0.141	0.145	0.200	0.0669	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Radium-228</b>	<b>0.202</b>		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Thallium-208</b>	<b>0.0969</b>		0.0786	0.0793		0.0347	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Thorium-232</b>	<b>0.202</b>		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-234	-0.728	U	0.938	0.942		0.840	pCi/g	11/02/20 16:42	11/26/20 16:34	1
<b>Thorium 228</b>	<b>0.373</b>		0.0936	0.105		0.0446	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-235	-0.156	U	0.503	0.503		0.276	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-238	-0.728	U	0.938	0.942		0.840	pCi/g	11/02/20 16:42	11/26/20 16:34	1

**Client Sample ID: HPPG-ESU-TU153C-017**

**Lab Sample ID: 160-40090-17**

Date Collected: 10/23/20 09:03

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.290	U	0.565	0.566		0.325	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Actinium 228</b>	<b>0.211</b>		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Bismuth-212	0.340	U	0.590	0.592		0.452	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Bismuth-214</b>	<b>0.309</b>		0.107	0.111		0.0497	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Cesium-137	0.0155	U	0.0529	0.0529	0.0700	0.0421	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Lead-210	0.696	U	1.54	1.54		1.24	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Lead-212</b>	<b>0.385</b>		0.0839	0.0976		0.0430	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Lead-214</b>	<b>0.413</b>		0.0911	0.101		0.0423	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Potassium-40</b>	<b>8.06</b>		1.23	1.48		0.282	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Protactinium-231	0.000	U	0.438	0.438		1.99	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Protactinium-234	0.0494	U	0.0806	0.0808		0.209	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Radium-226</b>	<b>0.309</b>		0.107	0.111	0.200	0.0497	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Radium-228</b>	<b>0.211</b>		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Thallium-208</b>	<b>0.161</b>		0.0500	0.0527		0.0172	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Thorium-232</b>	<b>0.211</b>		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Thorium-234	-0.391	U	0.174	0.179		1.05	pCi/g	11/02/20 16:42	11/26/20 16:36	1
<b>Thorium 228</b>	<b>0.385</b>		0.0839	0.0976		0.0430	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Uranium-235	-0.0376	U	0.110	0.110		0.406	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Uranium-238	-0.391	U	0.174	0.179		1.05	pCi/g	11/02/20 16:42	11/26/20 16:36	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-018**

**Lab Sample ID: 160-40090-18**

Date Collected: 10/23/20 09:06

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.168	U	0.640	0.640		0.391	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Actinium 228</b>	<b>0.490</b>		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Bismuth-212	-0.0501	U	0.791	0.791		0.647	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Bismuth-214</b>	<b>0.496</b>		0.132	0.142		0.0526	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Cesium-137	-0.00367	U	0.0760	0.0760	0.0700	0.0623	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Lead-210</b>	<b>1.72</b>		1.44	1.46		0.933	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Lead-212</b>	<b>0.461</b>		0.0985	0.110		0.0486	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Lead-214</b>	<b>0.402</b>		0.129	0.135		0.0571	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Potassium-40</b>	<b>9.65</b>		1.43	1.73		0.123	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Protactinium-231	0.000	U	0.703	0.703		2.70	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Protactinium-234	-0.105	U	0.318	0.318		0.258	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Radium-226</b>	<b>0.496</b>		0.132	0.142	0.200	0.0526	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Radium-228</b>	<b>0.490</b>		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Thallium-208</b>	<b>0.168</b>		0.0849	0.0866		0.0366	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Thorium-232</b>	<b>0.490</b>		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Thorium-234</b>	<b>0.697</b>		0.612	0.617		0.488	pCi/g	11/02/20 16:42	11/26/20 16:37	1
<b>Thorium 228</b>	<b>0.461</b>		0.0985	0.110		0.0486	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Uranium-235	0.0441	U	0.261	0.261		0.457	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Uranium-238	0.697		0.612	0.617		0.488	pCi/g	11/02/20 16:42	11/26/20 16:37	1

**Client Sample ID: HPPG-ESU-TU153C-019**

**Lab Sample ID: 160-40090-19**

Date Collected: 10/23/20 09:10

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.353	U	0.685	0.687		0.396	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Actinium 228</b>	<b>0.563</b>		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Bismuth-212	-0.274	U	0.688	0.689		0.542	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Bismuth-214</b>	<b>0.351</b>		0.119	0.125		0.0535	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Cesium-137	-0.0282	U	0.0606	0.0606	0.0700	0.0475	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Lead-210	-0.339	U	1.47	1.47		1.20	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Lead-212</b>	<b>0.387</b>		0.0746	0.0898		0.0279	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Lead-214</b>	<b>0.416</b>		0.101	0.110		0.0370	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Potassium-40</b>	<b>8.18</b>		1.32	1.56		0.255	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Protactinium-231	-0.765	U	2.49	2.49		2.02	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Protactinium-234	-0.102	U	0.286	0.286		0.233	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Radium-226</b>	<b>0.351</b>		0.119	0.125	0.200	0.0535	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Radium-228</b>	<b>0.563</b>		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Thallium-208</b>	<b>0.156</b>		0.0504	0.0529		0.0139	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Thorium-232</b>	<b>0.563</b>		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Thorium-234	0.312	U	0.839	0.840		0.838	pCi/g	11/02/20 16:42	11/26/20 16:38	1
<b>Thorium 228</b>	<b>0.387</b>		0.0746	0.0898		0.0279	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Uranium-235	0.0910	U	0.196	0.197		0.440	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Uranium-238	0.312	U	0.839	0.840		0.838	pCi/g	11/02/20 16:42	11/26/20 16:38	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-020**

**Lab Sample ID: 160-40090-20**

Date Collected: 10/23/20 09:10

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0380	U	0.0640	0.0642		0.287	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Actinium 228</b>	<b>0.399</b>		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Bismuth-212	0.362	U	0.646	0.647		0.505	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Bismuth-214</b>	<b>0.404</b>		0.0914	0.101		0.0324	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Cesium-137	-0.0150	U	0.0451	0.0451	0.0700	0.0358	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Lead-210	-0.398	U		1.26		1.02	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Lead-212</b>	<b>0.425</b>		0.0687	0.0880		0.0249	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Lead-214</b>	<b>0.363</b>		0.0769	0.0857		0.0391	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Potassium-40</b>	<b>7.97</b>		1.06	1.33		0.0815	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Protactinium-231	0.000	U	0.224	0.224		1.58	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Protactinium-234	-0.0811	U	0.228	0.228		0.185	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Radium-226</b>	<b>0.404</b>		0.0914	0.101	0.200	0.0324	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Radium-228</b>	<b>0.399</b>		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Thallium-208</b>	<b>0.128</b>		0.0368	0.0391		0.00824	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Thorium-232</b>	<b>0.399</b>		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Thorium-234	0.334	U	0.810	0.811		0.659	pCi/g	11/02/20 15:15	11/26/20 12:44	1
<b>Thorium 228</b>	<b>0.425</b>		0.0687	0.0880		0.0249	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Uranium-235	0.220	U	0.236	0.237		0.254	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Uranium-238	0.334	U	0.810	0.811		0.659	pCi/g	11/02/20 15:15	11/26/20 12:44	1

**Client Sample ID: HPPG-ESU-TU153C-021**

**Lab Sample ID: 160-40090-21**

Date Collected: 10/23/20 09:11

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0247	U	0.0775	0.0775	0.160	0.0619	pCi/g	11/06/20 11:01	01/13/21 06:54	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	75.2		40 - 110					11/06/20 11:01	01/13/21 06:54	1

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.00630	U	0.0139	0.0139	0.100	0.0129	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	0.00210	U	0.0126	0.0126	0.100	0.00978	pCi/g	12/15/20 12:11	12/23/20 14:28	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Pu-242 (T)	82.9		30 - 110					12/15/20 12:11	12/23/20 14:28	1

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.365		0.0567	0.0644	0.250	0.00707	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0321		0.0185	0.0187	0.100	0.00622	pCi/g	11/03/20 12:03	12/03/20 16:16	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-021**

**Lab Sample ID: 160-40090-21**

Date Collected: 10/23/20 09:11

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Uranium-238	0.339		0.0542	0.0612	0.250	0.00499	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	79.8		30 - 110					11/03/20 12:03	12/03/20 16:16	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium-227	-0.351	U	0.582	0.584		0.466	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Actinium 228	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Bismuth-212	-0.0213	U	0.677	0.677		0.556	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Bismuth-214	-0.0170	U	0.0682	0.0682		0.184	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Cesium-137	-0.0275	U	0.0649	0.0650	0.0700	0.0510	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-210	1.31		1.24	1.25		0.842	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-212	0.310		0.0891	0.0977		0.0503	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-214	0.384		0.121	0.127		0.0554	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Potassium-40	7.34		1.29	1.49		0.308	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Protactinium-231	0.398	U	1.62	1.62		2.34	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Protactinium-234	-0.0994	U	0.317	0.317		0.258	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Radium-226	-0.0170	U	0.0682	0.0682	0.200	0.184	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Radium-228	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thallium-208	0.138		0.0753	0.0767		0.0348	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium-232	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium-234	0.547		0.562	0.565		0.428	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium 228	0.310		0.0891	0.0977		0.0503	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Uranium-235	0.201	U	0.396	0.397		0.398	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Uranium-238	0.547		0.562	0.565		0.428	pCi/g	11/02/20 15:34	11/26/20 14:43	1

**Client Sample ID: HPPG-ESU-TU153C-022**

**Lab Sample ID: 160-40090-22**

Date Collected: 10/23/20 09:12

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium-227	-0.362	U	0.601	0.603		0.379	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Actinium 228	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Bismuth-212	0.0421	U	0.565	0.565		0.460	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Bismuth-214	0.410		0.123	0.130		0.0462	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Cesium-137	0.0259	U	0.0614	0.0614	0.0700	0.0481	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-210	-0.174	U	1.32	1.32		1.09	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-212	0.244		0.0919	0.0972		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-214	0.393		0.109	0.116		0.0399	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Potassium-40	7.26		1.26	1.46		0.127	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Protactinium-231	-0.898	U	2.59	2.59		2.10	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Protactinium-234	0.0779	U	0.191	0.192		0.207	pCi/g	11/02/20 15:15	11/26/20 12:43	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-022**

**Lab Sample ID: 160-40090-22**

Date Collected: 10/23/20 09:12

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Radium-226	0.410		0.123	0.130	0.200	0.0462	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Radium-228	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thallium-208	0.0308	U	0.0807	0.0808		0.0443	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium-232	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium-234	-0.225	U	1.06	1.06		0.877	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium 228	0.244		0.0919	0.0972		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Uranium-235	-0.190	U	0.563	0.563		0.327	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Uranium-238	-0.225	U	1.06	1.06		0.877	pCi/g	11/02/20 15:15	11/26/20 12:43	1

**Client Sample ID: HPPG-ESU-TU153C-023**

**Lab Sample ID: 160-40090-23**

Date Collected: 10/23/20 09:13

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	0.0638	U	0.296	0.296		0.330	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Actinium 228	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Bismuth-212	0.133	U	0.767	0.767		0.621	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Bismuth-214	0.346		0.135	0.140		0.0549	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Cesium-137	-0.00225	U	0.0506	0.0506	0.0700	0.0415	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-210	0.794	U	1.25	1.26		0.814	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-212	0.310		0.0775	0.0873		0.0409	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-214	0.354		0.0845	0.0921		0.0480	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Potassium-40	8.27		1.24	1.50		0.262	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Protactinium-231	0.000	U	0.470	0.470		1.89	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Protactinium-234	0.0507	U	0.253	0.253		0.207	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Radium-226	0.346		0.135	0.140	0.200	0.0549	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Radium-228	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thallium-208	0.145		0.0526	0.0547		0.0213	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium-232	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium-234	0.104	U	0.133	0.133		0.457	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium 228	0.310		0.0775	0.0873		0.0409	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Uranium-235	0.000	U	0.188	0.188		0.347	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Uranium-238	0.104	U	0.133	0.133		0.457	pCi/g	11/02/20 15:15	11/26/20 12:41	1

**Client Sample ID: HPPG-ESU-TU153C-024**

**Lab Sample ID: 160-40090-24**

Date Collected: 10/23/20 09:15

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Actinium-227	-0.220	U	0.725	0.725		0.442	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Actinium 228	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Bismuth-212	-0.197	U	0.965	0.965		0.779	pCi/g	11/02/20 15:15	11/26/20 12:59	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-ESU-TU153C-024**

**Lab Sample ID: 160-40090-24**

Date Collected: 10/23/20 09:15

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.395		0.143	0.150		0.0636	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Cesium-137	0.0370	U	0.0751	0.0752	0.0700	0.0586	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-210	0.643	U	1.33	1.34		1.05	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-212	0.347		0.0999	0.108		0.0584	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-214	0.352		0.119	0.126		0.0513	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Potassium-40	9.76		1.53	1.90		0.278	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Protactinium-231	0.0000000	U	2.92	2.92		2.41	pCi/g	11/02/20 15:15	11/26/20 12:59	1
	600									9
Protactinium-234	-0.0121	U	0.0278	0.0278		0.272	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Radium-226	0.395		0.143	0.150	0.200	0.0636	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Radium-228	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thallium-208	0.215		0.0665	0.0709		0.0224	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium-232	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium-234	0.278	U	0.258	0.260		0.815	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium 228	0.347		0.0999	0.108		0.0584	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Uranium-235	-0.0113	U	0.673	0.673		0.331	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Uranium-238	0.278	U	0.258	0.260		0.815	pCi/g	11/02/20 15:15	11/26/20 12:59	1

**Client Sample ID: HPPG-ESU-TU153C-025**

**Lab Sample ID: 160-40090-25**

Date Collected: 10/23/20 09:17

Matrix: Solid

Date Received: 10/26/20 08:38

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.241		0.411	0.412		0.218	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Actinium 228	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Bismuth-212	0.365	U	0.671	0.672		0.504	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Bismuth-214	0.557		0.133	0.145		0.0311	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Cesium-137	-0.0606	U	0.0592	0.0595	0.0700	0.0767	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-210	1.14		1.39	1.40		0.934	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-212	0.357		0.0804	0.0886		0.0340	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-214	0.432		0.108	0.117		0.0617	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Potassium-40	8.81		1.72	1.94		0.434	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Protactinium-231	0.000	U	0.302	0.302		2.20	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Protactinium-234	-0.0193	U	0.0393	0.0393		0.272	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Radium-226	0.557		0.133	0.145	0.200	0.0311	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Radium-228	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thallium-208	0.120		0.0505	0.0519		0.0174	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium-232	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium-234	-0.995	U	0.661	0.670		0.857	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium 228	0.357		0.0804	0.0886		0.0340	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Uranium-235	0.181	U	0.354	0.354		0.457	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Uranium-238	-0.995	U	0.661	0.670		0.857	pCi/g	11/02/20 15:15	11/26/20 13:44	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Client Sample ID: HPPG-F-017**

Date Collected: 10/23/20 08:37  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-26**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.160	U	0.453	0.453		0.303	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Actinium 228</b>	<b>0.311</b>		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Bismuth-212	-0.319	U	0.794	0.795		0.629	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Bismuth-214</b>	<b>0.412</b>		0.115	0.123		0.0447	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Cesium-137	0.00304	U	0.0586	0.0586	0.0700	0.0333	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Lead-210</b>	<b>1.19</b>		1.57	1.57		0.933	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Lead-212</b>	<b>0.399</b>		0.0880	0.102		0.0454	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Lead-214</b>	<b>0.384</b>		0.0997	0.107		0.0547	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Potassium-40</b>	<b>6.90</b>		1.16	1.36		0.271	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Protactinium-231	-0.356	U	2.46	2.46		2.01	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Protactinium-234	0.104	U	0.166	0.166		0.122	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Radium-226</b>	<b>0.412</b>		0.115	0.123	0.200	0.0447	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Radium-228</b>	<b>0.311</b>		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Thallium-208</b>	<b>0.156</b>		0.0594	0.0615		0.0257	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Thorium-232</b>	<b>0.311</b>		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Thorium-234	-0.372	U	0.829	0.830		0.729	pCi/g	11/02/20 15:15	11/26/20 13:48	1
<b>Thorium 228</b>	<b>0.399</b>		0.0880	0.102		0.0454	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Uranium-235	0.156	U	0.278	0.279		0.240	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Uranium-238	-0.372	U	0.829	0.830		0.729	pCi/g	11/02/20 15:15	11/26/20 13:48	1

**Client Sample ID: HPPG-F-018**

Date Collected: 10/23/20 09:10  
Date Received: 10/26/20 08:38

**Lab Sample ID: 160-40090-27**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.114	U	0.254	0.255		0.448	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Actinium 228</b>	<b>0.626</b>		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Bismuth-212	-0.805	U	1.57	1.57		1.23	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Bismuth-214</b>	<b>0.428</b>		0.219	0.223		0.0858	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Cesium-137	0.0219	U	0.108	0.108	0.0700	0.0868	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Lead-210</b>	<b>1.26</b>		1.46	1.47		0.947	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Lead-212</b>	<b>0.425</b>		0.111	0.124		0.0492	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Lead-214</b>	<b>0.314</b>		0.158	0.161		0.141	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Potassium-40</b>	<b>8.21</b>		1.82	2.00		0.367	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Protactinium-231	0.726	U	2.25	2.25		2.48	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Protactinium-234	-0.0179	U	0.0560	0.0560		0.217	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Radium-226</b>	<b>0.428</b>		0.219	0.223	0.200	0.0858	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Radium-228</b>	<b>0.626</b>		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Thallium-208</b>	<b>0.151</b>		0.0740	0.0757		0.0252	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Thorium-232</b>	<b>0.626</b>		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Thorium-234	-0.944	U	1.14	1.15		1.12	pCi/g	11/02/20 15:15	11/26/20 13:45	1
<b>Thorium 228</b>	<b>0.425</b>		0.111	0.124		0.0492	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Uranium-235	0.0282	U	0.196	0.196		0.365	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Uranium-238	-0.944	U	1.14	1.15		1.12	pCi/g	11/02/20 15:15	11/26/20 13:45	1

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# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

## Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A

Matrix: Solid

Analysis Batch: 490292

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 488460

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<hr/>										
<i>Carrier</i>	<i>MB MB</i>	<i>%Yield Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	86.4		40 - 110					11/06/20 11:01	11/26/20 10:48	1

Lab Sample ID: LCS 160-488460/1-A

Matrix: Solid

Analysis Batch: 490302

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 488460

Analyte	Spike		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	Added	Result								
Total Beta Strontium	7.77	6.487			0.537	0.160	0.0549	pCi/g	83	75 - 125
<hr/>										
<i>Carrier</i>	<i>LCS LCS</i>	<i>%Yield Qualifier</i>	<i>Limits</i>							
Sr Carrier	89.5		40 - 110							

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-487802/1-A

Matrix: Solid

Analysis Batch: 490870

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 487802

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Uranium-234	0.006585	U	0.0116	0.0116	0.250	0.00722	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	-0.002731	U	0.00546	0.00547	0.100	0.00635	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.008762		0.00876	0.00879	0.250	0.00510	pCi/g	11/03/20 12:03	12/03/20 16:16	1
<hr/>										
<i>Tracer</i>	<i>MB MB</i>	<i>%Yield Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Uranium-232	81.0		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Lab Sample ID: LCS 160-487802/2-A

Matrix: Solid

Analysis Batch: 490871

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 487802

Analyte	Spike		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	Added	Result								
Uranium-234	3.18	2.913			0.293	0.250	0.0103	pCi/g	91	84 - 120
Uranium-238	3.26	3.199			0.317	0.250	0.00514	pCi/g	98	82 - 122
<hr/>										
<i>Tracer</i>	<i>LCS LCS</i>	<i>%Yield Qualifier</i>	<i>Limits</i>							
Uranium-232	75.9		30 - 110							

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# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

**Lab Sample ID:** 160-40090-1 DU

**Client Sample ID:** HPPG-ESU-TU153C-001

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 490876

**Prep Batch:** 487802

Analyte	Sample	Sample	DU		DU		Total		LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)	Uncert.							
Uranium-234	0.415		0.4794		0.0752	0.250	0.00485	pCi/g				0.45	1
Uranium-235/23	0.0294		0.02594		0.0165	0.100	0.00603	pCi/g				0.10	1
6													
Uranium-238	0.352		0.4244		0.0693	0.250	0.00484	pCi/g				0.55	1
<i>Tracer</i>		<i>DU</i>	<i>DU</i>										
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>		<i>Limits</i>									
Uranium-232	84.7			30 - 110									

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

**Lab Sample ID:** MB 160-491927/1-A

**Client Sample ID:** Method Blank

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 493064

**Prep Batch:** 491927

Analyte	MB	MB	Count		Total		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert.	(2σ+/-)	Uncert.							
Plutonium-238	0.0000	U	0.0130	0.0130	0.100	0.0107	pCi/g			12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.01688	U	0.0124	0.0125	0.100	0.0138	pCi/g			12/15/20 12:11	12/23/20 14:28	1
<i>Tracer</i>		<i>MB</i>	<i>MB</i>									
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>		<i>Limits</i>								
Pu-242 (T)	89.2			30 - 110								

**Lab Sample ID:** LCS 160-491927/2-A

**Client Sample ID:** Lab Control Sample

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 493065

**Prep Batch:** 491927

Analyte	Spike	MB	MB	Count		Total		LOQ	DLC	Unit	%Rec	Limits
	Added	Result	Qualifier	Uncert.	(2σ+/-)	Uncert.						
Plutonium-238	2.61	2.475		0.251	0.100	0.00459	pCi/g				95	80 - 125
Plutonium-239/2	2.64	2.610		0.262	0.100	0.00796	pCi/g				99	81 - 125
40												
<i>Tracer</i>		<i>LCS</i>	<i>LCS</i>									
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>		<i>Limits</i>								
Pu-242 (T)	88.4			30 - 110								

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-487736/1-A

**Client Sample ID:** Method Blank

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 490289

**Prep Batch:** 487736

Analyte	MB	MB	Count		Total		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert.	(2σ+/-)	Uncert.							
Actinium-227	-0.2720	U	0.534	0.535	0.305	pCi/g				11/02/20 15:15	11/26/20 12:47	1
Actinium 228	0.06904		0.112	0.112	0.0508	pCi/g				11/02/20 15:15	11/26/20 12:47	1
Bismuth-212	0.2256	U	0.391	0.391	0.281	pCi/g				11/02/20 15:15	11/26/20 12:47	1
Bismuth-214	-0.01411	U	0.137	0.137	0.114	pCi/g				11/02/20 15:15	11/26/20 12:47	1
Cesium-137	0.01799	U	0.0299	0.0300	0.0211	pCi/g				11/02/20 15:15	11/26/20 12:47	1

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** MB 160-487736/1-A

**Matrix:** Solid

**Analysis Batch:** 490289

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 487736

Analyte	Result	MB	MB	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac	
				Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Lead-210	0.0000	U		0.266	0.266	0.821	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Lead-212	-0.06622	U		0.0814	0.0819	0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Lead-214	-0.01264	U		0.0648	0.0648	0.0539	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Potassium-40	-0.1927	U		0.684	0.685	0.430	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Protactinium-231	0.0000	U		0.422	0.422	1.34	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Protactinium-234	0.1019	U		0.0770	0.0777	0.135	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Radium-226	-0.01411	U		0.137	0.137	0.200	0.114	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Radium-228	0.06904			0.112	0.112	0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Thallium-208	-0.0008951	U		0.00144	0.00144	0.0283	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Thorium-232	0.06904			0.112	0.112	0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Thorium-234	0.1076	U		0.274	0.275	0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Thorium 228	-0.06622	U		0.0814	0.0819	0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Uranium-235	-0.1276	U		0.343	0.343	0.277	pCi/g	11/02/20 15:15	11/26/20 12:47	1	
Uranium-238	0.1076	U		0.274	0.275	0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1	

**Lab Sample ID:** LCS 160-487736/2-A

**Matrix:** Solid

**Analysis Batch:** 490283

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 487736

Analyte	Spike Added	Spike	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Added	Result	Qual	Uncert. (2σ+/-)					
Americium-241	96.4		101.2		11.9		0.535	pCi/g	105	87 - 116
Cesium-137	26.8		29.82		3.13	0.0700	0.133	pCi/g	111	87 - 120
Cobalt-60	9.53		10.35		1.09		0.0507	pCi/g	109	87 - 115

**Lab Sample ID:** MB 160-487745/1-A

**Matrix:** Solid

**Analysis Batch:** 490285

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 487745

Analyte	Result	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
		Uncert. (2σ+/-)	Uncert. (2σ+/-)	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.1051	U		0.286	0.286		0.242	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Actinium 228	-0.05311	U		0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Bismuth-212	0.3615	U		0.631	0.632		0.456	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Bismuth-214	-0.006509	U		0.0103	0.0103		0.133	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Cesium-137	-0.005242	U		0.0584	0.0584	0.0700	0.0473	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-210	-0.5704	U		1.34	1.35		1.13	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-212	-0.02745	U		0.0853	0.0854		0.0927	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-214	0.03566	U		0.0999	0.0999		0.0779	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Potassium-40	0.02764	U		0.931	0.931		0.460	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Protactinium-231	0.0000	U		0.524	0.524		2.05	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Protactinium-234	-0.01266	U		0.0227	0.0228		0.232	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Radium-226	-0.006509	U		0.0103	0.0103	0.200	0.133	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Radium-228	-0.05311	U		0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thallium-208	0.003138	U		0.0536	0.0536		0.0330	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium-232	-0.05311	U		0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium-234	-0.6595	U		0.807	0.811		0.899	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium 228	-0.02745	U		0.0853	0.0854		0.0927	pCi/g	11/02/20 16:42	11/26/20 14:46	1

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** MB 160-487745/1-A

**Matrix:** Solid

**Analysis Batch:** 490285

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 487745

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Uranium-235	0.005695	U		0.0355		0.0355		0.432	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Uranium-238	-0.6595	U		0.807		0.811		0.899	pCi/g	11/02/20 16:42	11/26/20 14:46	1

**Lab Sample ID:** LCS 160-487745/2-A

**Matrix:** Solid

**Analysis Batch:** 490282

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 487745

Analyte	Spike Added	LCS Result	LCS Qual	Total		LOQ	DLC	Unit	%Rec	Limits	%Rec.
				Uncert.	(2σ+/-)						
Americium-241	96.4	93.16		11.0			0.587	pCi/g	97	87 - 116	
Cesium-137	26.8	28.64		3.02		0.0700	0.106	pCi/g	107	87 - 120	
Cobalt-60	9.52	9.796		1.05			0.0389	pCi/g	103	87 - 115	

**Lab Sample ID:** 160-40090-19 DU

**Matrix:** Solid

**Analysis Batch:** 490281

**Client Sample ID:** HPPG-ESU-TU153C-019

**Prep Type:** Total/NA

**Prep Batch:** 487745

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total		LOQ	DLC	Unit	RER	Limit
					Uncert.	(2σ+/-)					
Actinium-227	-0.353	U	-0.2015	U	0.665		0.401	pCi/g		0.11	1
Actinium-228	0.563		0.4406		0.223		0.196	pCi/g		0.33	1
Bismuth-212	-0.274	U	0.07032	U	1.00		0.819	pCi/g		0.20	1
Bismuth-214	0.351		0.4133		0.157		0.0629	pCi/g		0.22	1
Cesium-137	-0.0282	U	-0.03922	U	0.0693		0.0700	0.0757	pCi/g	0.09	1
Lead-210	-0.339	U	-0.07097	U	1.67			1.19	pCi/g	0.09	1
Lead-212	0.387		0.4219		0.129		0.0608	pCi/g		0.16	1
Lead-214	0.416		0.5765		0.151		0.0760	pCi/g		0.61	1
Potassium-40	8.18		8.065		1.94		0.348	pCi/g		0.03	1
Protactinium-231	-0.765	U	0.0000	U	0.664		2.19	pCi/g		0.24	1
Protactinium-234	-0.102	U	-0.1127	U	0.130		0.233	pCi/g		0.03	1
Radium-226	0.351		0.4133		0.157		0.200	0.0629	pCi/g	0.22	1
Radium-228	0.563		0.4406		0.223		0.196	pCi/g		0.33	1
Thallium-208	0.156		0.1745		0.0707		0.0223	pCi/g		0.15	1
Thorium-232	0.563		0.4406		0.223		0.196	pCi/g		0.33	1
Thorium-234	0.312	U	0.5803		0.725		0.463	pCi/g		0.17	1
Thorium-228	0.387		0.4219		0.129		0.0608	pCi/g		0.16	1
Uranium-235	0.0910	U	0.08866	U	0.224		0.365	pCi/g		0.01	1
Uranium-238	0.312	U	0.5803		0.725		0.463	pCi/g		0.17	1

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# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

**Rad**

**Leach Batch: 486973**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	Dry and Grind	
160-40090-2	HPPG-ESU-TU153C-002	Total/NA	Solid	Dry and Grind	
160-40090-3	HPPG-ESU-TU153C-003	Total/NA	Solid	Dry and Grind	
160-40090-4	HPPG-ESU-TU153C-004	Total/NA	Solid	Dry and Grind	
160-40090-5	HPPG-ESU-TU153C-005	Total/NA	Solid	Dry and Grind	
160-40090-6	HPPG-ESU-TU153C-006	Total/NA	Solid	Dry and Grind	
160-40090-7	HPPG-ESU-TU153C-007	Total/NA	Solid	Dry and Grind	
160-40090-8	HPPG-ESU-TU153C-008	Total/NA	Solid	Dry and Grind	
160-40090-9	HPPG-ESU-TU153C-009	Total/NA	Solid	Dry and Grind	
160-40090-10	HPPG-ESU-TU153C-010	Total/NA	Solid	Dry and Grind	
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	Dry and Grind	
160-40090-12	HPPG-ESU-TU153C-012	Total/NA	Solid	Dry and Grind	
160-40090-13	HPPG-ESU-TU153C-013	Total/NA	Solid	Dry and Grind	
160-40090-14	HPPG-ESU-TU153C-014	Total/NA	Solid	Dry and Grind	
160-40090-15	HPPG-ESU-TU153C-015	Total/NA	Solid	Dry and Grind	
160-40090-16	HPPG-ESU-TU153C-016	Total/NA	Solid	Dry and Grind	
160-40090-17	HPPG-ESU-TU153C-017	Total/NA	Solid	Dry and Grind	
160-40090-18	HPPG-ESU-TU153C-018	Total/NA	Solid	Dry and Grind	
160-40090-19	HPPG-ESU-TU153C-019	Total/NA	Solid	Dry and Grind	
160-40090-20	HPPG-ESU-TU153C-020	Total/NA	Solid	Dry and Grind	
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	Dry and Grind	
160-40090-22	HPPG-ESU-TU153C-022	Total/NA	Solid	Dry and Grind	
160-40090-23	HPPG-ESU-TU153C-023	Total/NA	Solid	Dry and Grind	
160-40090-24	HPPG-ESU-TU153C-024	Total/NA	Solid	Dry and Grind	
160-40090-1 DU	HPPG-ESU-TU153C-001	Total/NA	Solid	Dry and Grind	
160-40090-19 DU	HPPG-ESU-TU153C-019	Total/NA	Solid	Dry and Grind	

**Leach Batch: 486980**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-25	HPPG-ESU-TU153C-025	Total/NA	Solid	Dry and Grind	
160-40090-26	HPPG-F-017	Total/NA	Solid	Dry and Grind	
160-40090-27	HPPG-F-018	Total/NA	Solid	Dry and Grind	

**Prep Batch: 487736**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-20	HPPG-ESU-TU153C-020	Total/NA	Solid	Fill_Geo-21	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	Fill_Geo-21	486973
160-40090-22	HPPG-ESU-TU153C-022	Total/NA	Solid	Fill_Geo-21	486973
160-40090-23	HPPG-ESU-TU153C-023	Total/NA	Solid	Fill_Geo-21	486973
160-40090-24	HPPG-ESU-TU153C-024	Total/NA	Solid	Fill_Geo-21	486973
160-40090-25	HPPG-ESU-TU153C-025	Total/NA	Solid	Fill_Geo-21	486980
160-40090-26	HPPG-F-017	Total/NA	Solid	Fill_Geo-21	486980
160-40090-27	HPPG-F-018	Total/NA	Solid	Fill_Geo-21	486980
MB 160-487736/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487736/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

**Prep Batch: 487745**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	Fill_Geo-21	486973
160-40090-2	HPPG-ESU-TU153C-002	Total/NA	Solid	Fill_Geo-21	486973
160-40090-3	HPPG-ESU-TU153C-003	Total/NA	Solid	Fill_Geo-21	486973

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# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1  
SDG: GJ46599778

## Rad (Continued)

### Prep Batch: 487745 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-4	HPPG-ESU-TU153C-004	Total/NA	Solid	Fill_Geo-21	486973
160-40090-5	HPPG-ESU-TU153C-005	Total/NA	Solid	Fill_Geo-21	486973
160-40090-6	HPPG-ESU-TU153C-006	Total/NA	Solid	Fill_Geo-21	486973
160-40090-7	HPPG-ESU-TU153C-007	Total/NA	Solid	Fill_Geo-21	486973
160-40090-8	HPPG-ESU-TU153C-008	Total/NA	Solid	Fill_Geo-21	486973
160-40090-9	HPPG-ESU-TU153C-009	Total/NA	Solid	Fill_Geo-21	486973
160-40090-10	HPPG-ESU-TU153C-010	Total/NA	Solid	Fill_Geo-21	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	Fill_Geo-21	486973
160-40090-12	HPPG-ESU-TU153C-012	Total/NA	Solid	Fill_Geo-21	486973
160-40090-13	HPPG-ESU-TU153C-013	Total/NA	Solid	Fill_Geo-21	486973
160-40090-14	HPPG-ESU-TU153C-014	Total/NA	Solid	Fill_Geo-21	486973
160-40090-15	HPPG-ESU-TU153C-015	Total/NA	Solid	Fill_Geo-21	486973
160-40090-16	HPPG-ESU-TU153C-016	Total/NA	Solid	Fill_Geo-21	486973
160-40090-17	HPPG-ESU-TU153C-017	Total/NA	Solid	Fill_Geo-21	486973
160-40090-18	HPPG-ESU-TU153C-018	Total/NA	Solid	Fill_Geo-21	486973
160-40090-19	HPPG-ESU-TU153C-019	Total/NA	Solid	Fill_Geo-21	486973
MB 160-487745/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487745/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40090-19 DU	HPPG-ESU-TU153C-019	Total/NA	Solid	Fill_Geo-21	486973

### Prep Batch: 487802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	ExtChrom	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	ExtChrom	486973
MB 160-487802/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-487802/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40090-1 DU	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973

### Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	DPS-0	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	DPS-0	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	DPS-0	486973
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

### Prep Batch: 491927

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	ExtChrom	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	ExtChrom	486973
MB 160-491927/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491927/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

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# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40090-1  
SDG: GJ46599778

## Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr	(40-110)
160-40090-1	HPPG-ESU-TU153C-001	88.5	
160-40090-11	HPPG-ESU-TU153C-011	91.9	
160-40090-21	HPPG-ESU-TU153C-021	75.2	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

**Tracer/Carrier Legend**  
Sr = Sr Carrier

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Pu-242 (T)	(30-110)
160-40090-1	HPPG-ESU-TU153C-001	87.6	
160-40090-11	HPPG-ESU-TU153C-011	91.1	
160-40090-21	HPPG-ESU-TU153C-021	82.9	
LCS 160-491927/2-A	Lab Control Sample	88.4	
MB 160-491927/1-A	Method Blank	89.2	

**Tracer/Carrier Legend**  
Pu-242 (T) = Pu-242 (T)

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		U-232	(30-110)
160-40090-1	HPPG-ESU-TU153C-001	80.8	
160-40090-1 DU	HPPG-ESU-TU153C-001	84.7	
160-40090-11	HPPG-ESU-TU153C-011	84.6	
160-40090-21	HPPG-ESU-TU153C-021	79.8	
LCS 160-487802/2-A	Lab Control Sample	75.9	
MB 160-487802/1-A	Method Blank	81.0	

**Tracer/Carrier Legend**  
U-232 = Uranium-232

Eurofins TestAmerica, St. Louis



Environment Testing  
America

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40094-1  
Laboratory Sample Delivery Group: D1189468  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 3

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

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*Authorized for release by:*  
4/13/2021 3:28:21 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

**Job ID: 160-40094-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40094-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Removing radium 226 by alpha spec to job series 2 per request.

Revision 2- Incorrect GFPC blue monthly background, correct background and results reported in revision.

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1  
SDG: D1189468

## Job ID: 160-40094-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

#### RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.9 C.

#### TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/28/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153C-B-001 (160-40094-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488774/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.  
HPPG-ESU-TU153C-B-001 (160-40094-1), (LCS 160-488774/2-A), (MB 160-488774/1-A) and (160-40094-A-1-K DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488775/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.  
HPPG-ESU-TU153C-B-001 (160-40094-1), (LCS 160-488775/2-A), (MB 160-488775/1-A) and (160-40094-A-1-J DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 10/28/2020, prepared on 11/04/2020 and analyzed on 12/02/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1  
SDG: D1189468

### Job ID: 160-40094-1 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-488209 is within limits and is stored in the level IV raw data. (MB 160-488209/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-018

Page 1 of 2

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Collection Information				# Containers	Preservatives (water)	Preservatives (soil)	Container Type	Matrix	Analysis Requested			
Sample ID	Date	Time	Method						Strontium-89 (EPA 905 M0D)	Ra-226 by Alpha spec, Isotopic U (234,235Ra,238)	Dose Rate uR/Hr	Evidence Bag ID
HPPG-FSU-TU153C-8-001	10/23/2020	13:03	G	SO 1	16 oz. plastic jar	X	X X	X	4	D1189468		

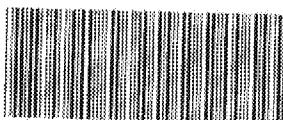
**Special Instructions:**  
21 day ingrowth results only  
Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turnaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I <input type="checkbox"/>	II <input type="checkbox"/>	III <input type="checkbox"/>	Project Specific
------------------	--------------------------------	---------------------------------	---------------------------------	--------------------------------	-----------------------	----------------------------	-----------------------------	------------------------------	------------------

Method Codes G = Composite; G = Grab      Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:28	SHIPPED TO LAB via FE		10/23/2020 08:38

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

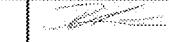


160-40094 Chain of Custody



**All Transfers for COC 501197RSY-018**

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:28	SHIPPED TO LAB via RE		10/26/2020 6:38

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40094-1  
SDG Number: D1189468**Login Number: 40094****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1  
SDG: D1189468

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy

None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1  
SDG: D1189468

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40094-1	HPPG-ESU-TU153C-B-001	Solid	10/23/20 13:03	10/26/20 08:38	

Eurofins TestAmerica, St. Louis

# Client Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40094-1  
 SDG: D1189468

**Client Sample ID: HPPG-ESU-TU153C-B-001**
**Lab Sample ID: 160-40094-1**

Matrix: Solid

 Date Collected: 10/23/20 13:03  
 Date Received: 10/26/20 08:38

**Method: 905.0 - Total Beta Strontium (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.00953	U	0.0641	0.0641	0.160	0.0534	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	90.3		40 - 110					11/06/20 11:01	11/26/20 10:48	1

**Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.0258		0.0228	0.0229	0.100	0.0146	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.0218		0.0154	0.0155	0.100	0.00653	pCi/g	11/10/20 16:55	12/07/20 15:19	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Pu-242 (T)	84.5		30 - 110					11/10/20 16:55	12/07/20 15:19	1

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.393		0.0583	0.0670	0.250	0.00695	pCi/g	11/10/20 17:08	12/07/20 15:15	1
Uranium-235/236	0.0210		0.0166	0.0167	0.100	0.00612	pCi/g	11/10/20 17:08	12/07/20 15:15	1
Uranium-238	0.371		0.0560	0.0641	0.250	0.00491	pCi/g	11/10/20 17:08	12/07/20 15:15	1
<b>Tracer</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Uranium-232	83.8		30 - 110					11/10/20 17:08	12/07/20 15:15	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.484		0.159	0.167	0.111	0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Actinium-227	-0.301	U	0.498	0.499	0.356	0.356	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Bismuth-212	0.441	U	0.883	0.884	0.697	0.697	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Bismuth-214	0.395		0.106	0.114	0.0408	0.0408	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Cesium-137	-0.0202	U	0.0516	0.0516	0.0700	0.0406	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-210	0.488	U	1.08	1.08	0.763	0.763	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-212	0.363		0.0762	0.0895	0.0339	0.0339	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-214	0.438		0.0932	0.104	0.0469	0.0469	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Potassium-40	8.77		1.42	1.68	0.418	0.418	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Protactinium-231	0.661	U	2.41	2.41	1.96	1.96	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Protactinium-234	0.0491	U	0.163	0.163	0.224	0.224	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Radium-226	0.395		0.106	0.114	0.0408	0.0408	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Radium-228	0.484		0.159	0.167	0.111	0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thallium-208	0.123		0.0623	0.0636	0.0293	0.0293	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium 228	0.363		0.0762	0.0895	0.0339	0.0339	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium-232	0.484		0.159	0.167	0.111	0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium-234	0.581		0.631	0.635	0.413	0.413	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Uranium-235	0.0806	U	0.201	0.202	0.354	0.354	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Uranium-238	0.581		0.631	0.635	0.413	0.413	pCi/g	11/04/20 13:46	12/02/20 13:32	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

## Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A

Matrix: Solid

Analysis Batch: 490292

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 488460

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
<hr/>										
Carrier	MB MB	%Yield Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	86.4		40 - 110					11/06/20 11:01	11/26/20 10:48	1

Lab Sample ID: LCS 160-488460/1-A

Matrix: Solid

Analysis Batch: 490302

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 488460

Analyte	Spike Added		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	MB	MB								
Total Beta Strontium		7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125
<hr/>										
Carrier	LCS	LCS	%Yield	Qualifier	Limits					
Sr Carrier	89.5				40 - 110					

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-488775/1-A

Matrix: Solid

Analysis Batch: 491105

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 488775

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Uranium-234	0.0000	U	0.0152	0.0152	0.250	0.0125	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.002733	U	0.00947	0.00947	0.100	0.00636	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	-0.002192	U	0.0181	0.0181	0.250	0.0153	pCi/g	11/10/20 17:08	12/07/20 15:14	1
<hr/>										
Tracer	MB MB	%Yield Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	81.2		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Lab Sample ID: LCS 160-488775/2-A

Matrix: Solid

Analysis Batch: 491106

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 488775

Analyte	Spike Added		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	MB	MB								
Uranium-234		3.18	3.300		0.328	0.250	0.0121	pCi/g	104	84 - 120
Uranium-238		3.26	3.432		0.339	0.250	0.00541	pCi/g	105	82 - 122
<hr/>										
Tracer	LCS	LCS	%Yield	Qualifier	Limits					
Uranium-232	78.7				30 - 110					

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

**Lab Sample ID:** 160-40094-1 DU

**Client Sample ID:** HPPG-ESU-TU153C-B-001

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 491115

**Prep Batch:** 488775

Analyte	Sample	Sample	DU		DU		Total		LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)	Uncert.							
Uranium-234	0.393		0.4388		0.0712	0.250	0.00950	pCi/g				0.33	1
Uranium-235/23	0.0210		0.02286		0.0184	0.100	0.00835	pCi/g				0.05	1
6													
Uranium-238	0.371		0.4134		0.0679	0.250	0.00474	pCi/g				0.32	1
<i>Tracer</i>		<i>DU DU</i>		<i>Yield Qualifier</i>		<i>Limits</i>							
Uranium-232	81.9												

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

**Lab Sample ID:** MB 160-488774/1-A

**Client Sample ID:** Method Blank

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 491103

**Prep Batch:** 488774

Analyte	Sample	Sample	MB		MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qual	(2σ+/-)	Uncert.	(2σ+/-)	Uncert.								
Plutonium-238	0.005594	U	0.0194	0.0194	0.100	0.0150	pCi/g		11/10/20	16:55	12/07/20	15:19		1
Plutonium-239/240	0.003733	U	0.00747	0.00747	0.100	0.00434	pCi/g		11/10/20	16:55	12/07/20	15:19		1
<i>Tracer</i>		<i>MB MB</i>		<i>Yield Qualifier</i>		<i>Limits</i>								
Pu-242 (T)	92.5													

**Lab Sample ID:** LCS 160-488774/2-A

**Client Sample ID:** Lab Control Sample

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 491099

**Prep Batch:** 488774

Analyte	Sample	Sample	Spike		LCS		Count	Total	LOQ	DLC	Unit	%Rec	Limits	%Rec.
	Result	Added	Result	Qual	(2σ+/-)	Uncert.								
Plutonium-238			2.61	2.527	0.255	0.100	0.0205	pCi/g				97	80 - 125	
Plutonium-239/2			2.64	2.457	0.248	0.100	0.00633	pCi/g				93	81 - 125	
40														
<i>Tracer</i>		<i>LCS LCS</i>		<i>Yield Qualifier</i>		<i>Limits</i>								
Pu-242 (T)	97.3													

**Lab Sample ID:** 160-40094-1 DU

**Client Sample ID:** HPPG-ESU-TU153C-B-001

**Matrix:** Solid

**Prep Type:** Total/NA

**Analysis Batch:** 491109

**Prep Batch:** 488774

Analyte	Sample	Sample	DU		DU		Uncert.	Total	LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)	Uncert.							
Plutonium-238	0.0258		0.01815		0.0135	0.100	0.00469	pCi/g				0.21	1
Plutonium-239/2	0.0218		0.002019	U	0.00404	0.100	0.00470	pCi/g				1.01	1
40													
<i>Tracer</i>		<i>DU DU</i>		<i>Yield Qualifier</i>		<i>Limits</i>							
Pu-242 (T)	87.6												

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# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488209/1-A

Matrix: Solid

Analysis Batch: 490647

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 488209

Analyte	Result	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac	
					Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.02805	U			0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Actinium-227	0.01440	U			0.451	0.451	0.280	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-212	0.0000	U			0.189	0.189	0.383	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Bismuth-214	0.01315	U			0.147	0.147	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Cesium-137	-0.02984	U			0.0378	0.0379	0.0700	0.0533	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-210	1.586				1.34	1.36	0.890	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-212	0.009318	U			0.101	0.101	0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Lead-214	0.01598	U			0.107	0.107	0.0856	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Potassium-40	-0.1967	U			0.997	0.997	0.304	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-231	0.0000	U			0.158	0.158	1.98	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Protactinium-234	0.01447	U			0.0320	0.0320	0.216	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Radium-226	0.01315	U			0.147	0.147	0.200	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-228	0.02805	U			0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thallium-208	-0.004688	U			0.00594	0.00596	0.0547	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium 228	0.009318	U			0.101	0.101	0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-232	0.02805	U			0.199	0.199	0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Thorium-234	-0.5789	U			0.465	0.470	0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-235	0.06692	U			0.212	0.212	0.348	pCi/g	11/04/20 13:46	12/02/20 13:51	1	
Uranium-238	-0.5789	U			0.465	0.470	0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1	

Lab Sample ID: LCS 160-488209/2-A

Matrix: Solid

Analysis Batch: 490648

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 488209

Analyte	Spike Added	LCS Result	LCS Qual	Total			%Rec.	Limits
				Uncert. (2σ+/-)	LOQ	DLC		
Americium-241	96.4	98.24		10.3		0.585	102	87 - 116
Cesium-137	26.7	26.94		2.91	0.0700	0.128	101	87 - 120
Cobalt-60	9.50	9.522		1.03		0.0428	100	87 - 115

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# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

Rad

Leach Batch: 487040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Dry and Grind	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Fill_Geo-21	
MB 160-488209/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488209/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	DPS-0	
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 488774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	
MB 160-488774/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488774/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040

Prep Batch: 488775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	
MB 160-488775/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488775/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040

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# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40094-1  
SDG: D1189468

## Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr	(40-110)
160-40094-1	HPPG-ESU-TU153C-B-001	90.3	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

**Tracer/Carrier Legend**  
Sr = Sr Carrier

## Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Pu-242 (T)	(30-110)
160-40094-1	HPPG-ESU-TU153C-B-001	84.5	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	87.6	
LCS 160-488774/2-A	Lab Control Sample	97.3	
MB 160-488774/1-A	Method Blank	92.5	

**Tracer/Carrier Legend**  
Pu-242 (T) = Pu-242 (T)

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		U-232	(30-110)
160-40094-1	HPPG-ESU-TU153C-B-001	83.8	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	81.9	
LCS 160-488775/2-A	Lab Control Sample	78.7	
MB 160-488775/1-A	Method Blank	81.2	

**Tracer/Carrier Legend**  
U-232 = Uranium-232

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